FOOD INDUSTRIES

manufacturing and processing

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Preservers' Bill Should Be Enacted

MANUFACTURERS of jellies, jams, and preserves have long felt the need of specific standards, enforceable at law, which might permit them to compete in quality as well as in price. At present there are no legal definitions or standards. Rulings promulgated by the federal authorities have purported to establish such standards, but they have proved to be essentially non-enforceable, because the department must first prove what a pure fruit product is before a deficient product may be found to be in violation of the law.

¶ BY THE CONTEMPLATED AMENDMENT to the Food and Drugs Act, effective Nov. 1, 1930, submitted by Gilbert N. Haugen, chairman of the House Committee on Agriculture, provision is made for legal labeling of the various fruit products that should work to the advantage of the grower, the manufacturer, and the consumer.

¶ PRODUCERS will be benefited by a constantly expanding market for real fruit products; manufacturers will be able to sell on the basis of intrinsic worth, whether the item be a pure fruit jelly at top market price or a more or less synthetic "spread" for bread offered at a competitive figure; and the consumer always benefits when permitted to buy comestibles for just what they are—and so labeled.

¶ FOR PRESERVE AND JAM, the measure establishes a ratio of 45 pounds of fruit to 55 pounds of sugar, with a water-soluble solids content of not less than 68 per cent. For jelly, the ratio of pure fruit juice to sugar is 50:50, with at least 65 per cent of water-soluble solids. Apple butter must contain not more than 20 pounds of sugar to 50 pounds of the edible portion of fresh apples, or the equivalent in cold-packed, canned, or evaporated apples, the water-soluble solids to be not less than 43 per cent.

¶ THESE SPECIFICATIONS are in keeping with good modern practice and should work no hardships in the trade. Further recognition of commonly accepted methods of manufacture is the provision permitting the use of pectin and harmless organic acids, when enumerated on the label.

¶ THE LABEL must carry the names of all fruits used, listed in the order of their predominance by weight. For sweetening purposes there may be used any saccharine foodstuffs, except synthetic substances having sweetness but no nutritive value, provided they are named on the label in the order of their predominance by weight and in terms of their common usage—such as cane sugar, beet sugar, corn sugar.

¶ UNLESS these labeling requirements with respect to fruit, sugar, pectin, and organic acids are met by the manufacturer, the product shall be deemed misbranded and, in consequence, liable to seizure and attack through the courts. Imitation products must be labeled as such, with the common names of the ingredients from which they are made given in the order of their predominance by weight; with the specific exception of marmalade, fruit-pie filling, fruit sauce, and fountain crushed fruit.

¶ IN ADDITION to fruit products, the bill specifically defines honey preserve, jam, jelly, and apple butter as products in the manufacture of which honey is the only sweetening agent used, proper labeling being assumed by virtue of the intrinsic value of that delicacy.

THIS MEASURE is now on the calendar of Congress and it is highly desirable that we all remind our federal representatives that H.R. 11514 should become law.

EDITORIALS

MAY, 1930

Restricted Marketing Is Again a Failure

SUGAR PRODUCERS of Cuba are reliably reported to have abandoned further arrangements for restricted joint sale of their output. Thus sugar joins with coffee and rubber in demonstrating the futility of curtailing production, manipulating markets, and restraining competition on those raw materials which are the products of the soil.

It will be a great help to all of the food industries if they will take this lesson seriously to heart. It would be fortunate if it were possible to teach the lesson convincingly with respect to those crops for which artificial stimulus is being sought in the United States through unsound economic procedures. We have hopes that the current developments in co-operative marketing which are stimulated by the Federal Farm Board will be beneficial to agriculture. We hope that sane methods of marketing and the establishment of genuine co-operatives on sound principles will be encouraged. We wish that we could look with equal confidence to prompt abandonment of measures which take on in their essence merely price-fixing significance. There is a fundamental difference between the development of co-operative agencies in agriculture, with the encouragement of orderly marketing of agricultural products, and that other thing which is so often confused with it—an attempt at maintenance of unnaturally high price levels.

More Competition From Abroad

A RECENT caller at these offices was the chief engineer of a large South American fruit company and, although our knowledge of his native tongue is so fragmentary that the gentleman would fail to recognize a single word of our most magnificent Spanish, we were able to learn much of his mission through the aid of an interpreter. He felt that steamships were much too high priced in the United States, and in that we sympathized with him and secretly wished that we had as valid an excuse as he to run over to London or Glasgow. But he had no complaint against American refrigerating machinery, and some American firms are getting very sizable orders for compressors, insulation, and all the necessary accessories for pre-cooling plants and cold-storage warehouses.

From him we learned that the Southern Hemisphere is making rapid advances toward an important place in the fresh-fruit markets of the world. His firm is now shipping honey-dew melons to North American cities in increasing quantities and shipping bananas from Guayaquil to Chilean ports all the way from Iquique down to Valdivia. If the United States wants watermelons at this time of year they can be readily available—for a consideration. Chilean fruits, we were gravely informed, were more than the equal of the best that California produces, and would soon be competing with them for the Eastern and European markets.

In the November, 1929, issue FOOD INDUSTRIES recorded, on page 633, that the first shipment of Chilean oranges had arrived in New York in August and pointed out the significance of the event. They are now arriving in greater quantities, together with other kinds of fruits. Verily, the Southern Hemisphere is stepping out.

Tackling the Impossible

IN NO BRANCH of food production is man free from competition with other forms of life for the very materials on which he subsists. Livestock is subject to bacterial diseases and attacks by wild animals. Also it occasionally is the prey of domestic animals—dogs. Grain crops sometimes are attacked by fungus diseases that may defeat man in the competition for food. Growers must defend their truck crops as well as orchard and bush fruit crops from invasion by scabs, scales, bacterial, and insect attack, or lose the battle. For a time the domestic cane-sugar industry has been faced with huge losses due to the mosaic disease.

Even the fishing industry suffers from this competition. Those who are unfamiliar with oyster culture may be surprised to learn that starfish are invading certain New Jersey oyster beds where 32,000 acres of oysters have been planted and that, unless warm weather and heavy rains come soon, a $4,000,000 industry in a single locality will be ruined.

Protecting the sources of raw material of the sea-food industry is an extremely difficult task, and in many instances is impossible. In an effort to save the oyster beds the owners have resorted to dragging the sea floor with huge mops in whose fuzzy strands the starfish become entangled, and thus begin the first step of a journey to a fertilizer plant. It seems almost incredible that a starfish can injure an oyster, protected by its shell, yet it is one of its most formidable predatory enemies. The starfish wraps itself around the oyster and pushes out its stomach around the victim and digests it without the bother of opening its shell. And that is the end of the oyster. With difficulty those who live inland visualize the magnitude of the problem of attempting to protect from starfish a 32,000-acre oyster farm under 10 to 20 feet of water.

But men are courageous and dare to tackle huge tasks—on the farm as well as on the sea. When a pea crop is invaded by the pea louse, or aphid, the canner now can remove most of them mechanically from thousands of

acres by a recently devised machine known as the aphidozer. This measure, necessarily a remedial one, does not differ fundamentally in its ultimate purpose from the prophylactic measures of spraying or dusting fruit and vegetable crops as a means of destroying the competitive forms of life that would devour food intended for man. More power to the oystermen and their sea mops in what looks almost like a hopeless battle!

Vinegar

FROM TIME TO TIME food faddists of one sort or another fulminate as to the danger inherent in the use of vinegar. Unfortunately, the case against this ancient and honorable food accessory is given a certain semblance of stability by relatively early work done by disinterested and, presumably, honest investigators whose work has been embodied in otherwise trustworthy books of reference used by the medical profession. For example, Sir William Roberts, writing in 1891, pointed out, in "Diet and Digestion," that dilute acetic acid retards digestion, as indeed it does. Recent experimentation with comparable materials confirms the earlier findings. On the basis of the present-day theory of hydrogen ion concentration as a governing factor of enzymatic action, it is known that the use of any acid will retard salivary digestion—and, roughly, in direct proportion to the increase in acidity. As a matter of fact, solutions of acetic acid and lemon juice of the same hydrogen ion concentration probably would show similar retarding action.

Other objections to vinegar include the former charge of its responsibility for gastric ulcer, an unproved allegation that no longer is repeated in new medical literature. Equally easy is it to dispose of vinegar eels; they can't survive sterilization, and if they could, they would be harmless to man. The chief objection to vinegar centers around its acetic-acid content, and such criticism applies equally to the use of citric, tartaric, malic, phosphoric, lactic, and other acids. Of all of them, including acetic acid, it is true that they are dangerous to the health when consumed in concentrated form; and yet in their dilute condition one or more of them is characteristic of entirely wholesome food products.

Many foods are harmful to health when consumed in excess. Furthermore, by those unfortunates who come into this world possessed of relatively high sensitivity to certain proteins, a truly formidable list of every-day foods may fairly be characterized as poisonous.

There is altogether too much hazy rumor and unsubstantiated innuendo afloat. Medical practitioners are still endeavoring to debunk the myth connecting the inception of appendicitis with the presence in the appendix of grape seeds or other irritating substances. Perhaps even more obstinate, though less spectacular, is the absurd but ancient belief that canned food left in an open can becomes highly poisonous within the course of a few hours. The baleful effects of corn sirup (glucose), harking back to an accidental contamination due to badly made sulphurous acid some forty years ago in Great Britain, still calls for disclaimer from those who produce that perfectly wholesome form of carbohydrate. And other items are not difficult to call to mind, although it seems to be extremely difficult to separate fact from fancy in the public mind.

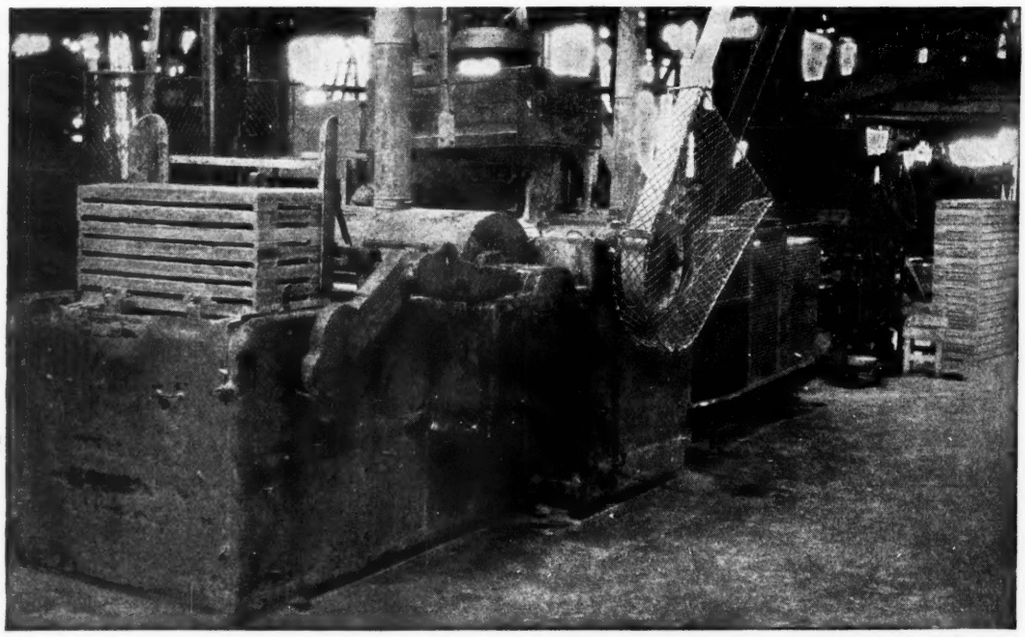
Those who are concerned with the welfare of vinegar are well warranted in maintaining the attitude that our present knowledge of human metabolism attests that there is no harmful effect in the rational use of well-made vinegar.

Has Your Product Been Misunderstood or Misused?

INVESTIGATORS in food chemistry are frequently hampered by the empiricism necessary when dealing with such complex chemical entities as natural plant and animal products. Their colleagues in the inorganic field work with substances that are much more easily defined chemically and physically. How often has confusion arisen because workers on the same problem have used slightly different analytical methods on the same substances or applied the same method to different products not exactly suitable to the method? Rigidly prescribed methods of analysis and research and, most important of all, universally accepted definitions are necessary corollaries of the complexity of food chemistry.

Elsewhere in this issue appears an article by three chemists in the citrus fruit pectin industry which it is hoped will clear up some of the wrong impressions extant concerning pectin and its proper use. This article recites a misunderstanding that arose because of lack of clear definition of the properties and limitations of pectin as well as lack of knowledge of the standard methods of its proper use. Had Herr Fiedler realized that pectin varies considerably in "grade" and "setting time" (properties) and that the structure of a fruit jelly is affected by its heat treatment (proper method of use) he could not have been mislead to the conclusion that it is impossible to form jellies from invert sugar.

Are there any other cases such as this among the many food products and food accessories manufactured in the United States? Is it possible that, because of hazy definition and vague standards of usage, *your* product is being misused, or incorrectly used, or inefficiently used? If there are such cases, and there no doubt are many of them, the remedy is here indicated in few words: Tell what your product is, what can be expected of it, and how to use it. Dont "hide your light under a bushel"—remove the bushel, let the light of your knowledge shed a glow on your fellow workers and the consumers of your product. That's what FOOD INDUSTRIES is for!



A MODERN DEPOSITOR, or "mogul," with belt and other moving parts well guarded

Freeing Candy Making From ACCIDENTS

The First of a Series Analyzing the Industrial Hazards of Food Manufacture

By W. DEAN KEEFER
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CANDY MAKING is one of the least hazardous of all specialized industries, both from the viewpoint of accident frequency and accident severity. Investigations of the National Safety Council show that it not only has the lowest accident rates in the food section, among such industries as milling, sugar refining, and dairying and dairy product manufacture, but that its record stands out as one of the best in the entire industrial field.

The accident frequency rate—that is, the number of lost-time accidents per 1,000,000 man-hours worked—for all of the 17 distinct groups of industries which reported to the National Safety Council for 1928 was 24.52. And the average accident severity rate—that is, the number of days lost per 1,000 man-hours—for these same industrial groups for 1928 was 2.03.

In contrast, the average accident-frequency rate for the confectionery manufacturing division of the National Safety Council for 1928 was 11.12, and the average accident-severity rate was 0.33. Only one other group, the manufacturers of rubber footwear, with an accident-frequency rate of 9.34 and an accident-severity rate of 0.25, had a better record.

Other industrial groups with low frequency or severity rates were as follows: explosive manufacturers, frequency 10.11, severity 5.26; railroad car manufacturers, frequency 10.62, severity 1.26; paper goods manufacturers, frequency 11.70, severity 0.38; electric appliance manufacturers, frequency 8.58, severity 0.61; telephone and telegraph workers, frequency 10.79, severity 1.13; textile manufacturers, frequency 11.73, severity 0.66.

Despite the low rates for the confectionery industry as a whole, the wide variation in the accident totals reported by various confectionery plants shows the need

for further work. If some candy factories, as a result of efficient safety organization, are able to go for a year or more without a single lost-time accident, there is no reason why other factories who face the same industrial and economic conditions should continue to have one accident after another, many of them severe.

For example, three small plants, with 10, 48, and 48 employees respectively, went through the year of 1928 without a single reportable lost time accident. Four additional plants, with 104, 230, 700, and 1,500 employees respectively, had accident frequency rates varying from 4 to 5.28, and severity rates varying from 0.01 to 0.40. Another group of plants, with from 30 to 600 employees, had accident frequency rates varying all the way from 10.49 to 81.63, and severity rates varying from 0.11 to 0.78. It will be seen that in some candy factories the number of accidents is many times as high as in others.

One of the most complete reports of accidents in confectionery manufacturing plants has been made by the State of New York for the period of July 1, 1924, to June 30, 1928. There is classified 33 different causes of accidents. Following is a list of 10 causes, together with the totals of accident cases, against which the greatest number of accidents were charged: handling heavy and bulky objects, 266; handling sharp and rough objects, 177; falls on the level, 172; hot substances and flames, 145; candy-making machines, 114; falls from elevations, 113; miscellaneous machinery, 103; striking against objects, 86; hand tools, 67; handling objects with trucks or wheelbarrows, 65. Among other causes of accidents were the following: automobiles, belt and chain conveyors, boiler and steam-pressure explosions, block and tackle, cutting and chopping machines, elevators, falling objects from elevators, mixer kettles, packing and wrapping machines, power-transmission apparatus, shaping and forming machines, and nails and other sharp objects on working floors.

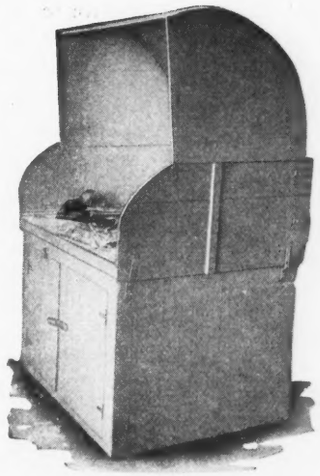
Of a total of 1,713 accident cases caused by falls from elevators, falls on the level, handling heavy and bulky objects, and poisonous substances, 8 resulted in death or total and permanent disabilities. The leading causes of permanent partial disabilities, including totals of cases, were as follows: candy making machines, 50; miscellaneous machinery, 49; handling heavy and bulky objects, 31; handling sharp and rough objects, 25; cutting and chopping machines, 20; falls from elevations, 18; mixers and kettles, 14; packing and wrapping machines, 14; hand tools, 11; and handling objects with trucks or wheelbarrows, 11.

THE leading causes of temporary disabilities were: handling heavy and bulky objects, 233; handling sharp and rough objects, 152; falls on the level, 143; hot substances and flames, 135; falls from elevations, 92; striking against objects, 78; candy making machines, 64; hand tools, 56; handling objects with trucks and wheelbarrows, 54; and miscellaneous machinery, 54.

Many of the modern candy-making establishments are located in well-constructed buildings, with equipment so installed and maintained as to afford reasonable safety for the employees.

Among the machines used in the candy industry which may be hazardous are: kettles, cookers, candy pullers, rollers and cutters, mixers, beaters, printers, depositors, starch bucks, starch bolters, moguls, enrobers, sizers, cutting and wrapping machines, revolving pans, and nut crushers.

All these machines have gears which should be effectively inclosed. Some of them, such as candy pullers, starch bucks, moguls, and certain sizers, have sprocket wheels and chains which, unless properly guarded, may be decidedly hazardous. All shafting and other revolving parts which are possible accident hazards should be protected for the safety of operators or others who may come in contact with them. Belts and pulleys should be safeguarded properly and belt shifters with positive action should be provided. If these machines are motor operated, starting and stopping buttons or inclosed safety switches should be installed in locations convenient to the operators. Asbestos or other heat-insulating material for hot water and steam pipes not only will afford protection to workers but also conserve much heat.



A METAL SHIELD stops pieces flying from the cutting-up table

AS A health and safety precaution, it is essential that no dust from sugar pulverizers escape into the room, as it is explosive when mixed with air. This demands proper ventilation of the apparatus and ventilation of the pulverizing department.

The National Fire Protection Association has adopted definite regulations, in substance as follows, covering sugar pulverizing:

1. If possible, the processes should be carried on in a detached special building. Otherwise, the processes shall be segregated on the upper floor of the building.

2. If conducted on the upper floor, the walls, partitions, floor and ceilings shall be of not less than 4-inch reinforced concrete, or the equivalent in strength and fire resistance; a portion of the exterior walls equal to not less than 10 per cent of the area of the walls, shall be of light, non-combustible material, preferably thin glass. (Thin glass skylights may be accepted in part or entirely in lieu of the glass area.)

3. Access should be from the outside or by openings protected by standard fire doors.

4. No conveyors, spouts, or chutes shall pass through any of the inner or separating walls of this portion of the plant.

5. Power belts or chains shall be incased both inside and outside the pulverizing department in dust-tight inclosures of substantial non-combustible material. Motors shall conform to standards of National Electrical Code for dusty locations.

6. All controlling and circuit-breaking devices shall be of the inclosed approved safety type. Cabinets or inclosures shall be dust-tight and kept entirely closed when apparatus is in operation.

7. Only electric incandescent lights inclosed in dust-proof globes provided with approved wire guards will be permitted for light.

8. All wiring shall be in conduit in accordance with the National Electrical Code.

9. Machines shall be well maintained and set, electrically grounded, with magnetic separators, with screened inspection openings, with exhaust fans to

remove sugar, with blades and spider fan of bronze or similar composition with ample clearance between blades and casing, with screens and dust collectors in fire-resistant inclosures, with relief vents piped out of doors. In addition, no open flames, or any kind of operations or repairs producing sparks or utilizing direct heat, shall be permitted while the pulverizing department is in operation or while there is dust in the air.

In general, special precautions should be observed by all employees while working about the cooking kettles. Following are possible causes of burns: (a) kettle explosions that may shower escaping steam and boiling sirup; (b) boiling over of ingredients; (c) burns from attempts to extinguish the flames when candy has boiled over; (d) spilling of candy when being poured out; (e) slipping on floor and coming in contact with hot kettles, pipes or kettle contents.

TO AVOID so-called "water hammer" explosions of cooking kettles, when steam is admitted to a cold kettle, the steam valve should always be opened slowly, to decrease the expansion strains.

When the inner surface of a kettle is deformed by a blow, the pressure within the jacket tends to increase the deformity, until finally the kettle ruptures and the steam and the boiling contents are thrown out. To minimize this hazard, every kettle should be inspected frequently, and all bruises or alterations in shape promptly corrected.

Reducing valves properly secured against changes by unauthorized persons should be used to protect all kettles that are operated at a pressure less than that of the main steam line. Such valves should be further protected by a safety valve set to blow at a pressure only slightly higher than the allowable working pressure of the kettle. Both of these valves should be tested at least once a day. All kettles should be provided with pressure gages that are inspected regularly.

Protection against foot burns may be afforded by "congress" shoes, fitting snugly about the ankles and free from cracks or holes. Long sleeves, gloves, and heavy aprons also afford protection against burns, although it is advocated by some that sleeves should be of elbow length for sanitary reasons.

One prominent candy manufacturer has prevented burns from the splashing of hot materials from two-handled pans by riveting metal shields adjacent to the handles.

In some candy plants there are special guards to prevent injury from the power-driven arms of candy pullers. These are supplemented by a monitor control which permits the operator to start and stop the puller by a push-button switch. Additional protection, particularly against unexpected falls, may be guaranteed by locating about the base of the contrivance a frame which when slightly pressed operates a stop switch.

For proper protection, the gaging roll of a batch roller should be covered. The cutters of a cutting machine should be so inclosed or covered that an employee cannot come in contact with them.

One candy manufacturer has effectively protected the gears of a candy shaper by erecting guards of solid sheet metal at the side and heavy wire screen over the rollers, thus affording protection but still permitting the workers to observe the candy as it is being processed.

Revolving beater arms for mixing fondants should be equipped with an interlocking device which prevents the power from being turned on until the cover over the beater arms is properly in place. Employees should be trained to observe special precautions not to come in contact with hot-water pipes which keep the filling mixtures in liquid condition.

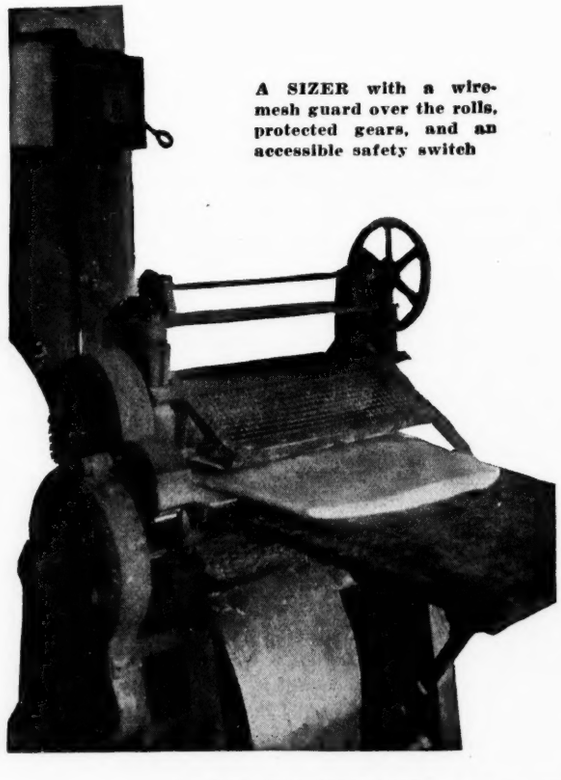
Because of dust explosion dangers, it is commended that dry rooms for hardening candy centers be of fire-resistant construction, cut off from other rooms, and steam heated, steam pipes so arranged that combustible trays, racks, dust, and the like, cannot come in contact with them; all incandescent electric lamps be inclosed in vapor-proof globes; all wiring be in accordance with the requirements of the National Electrical Code for dusty locations. To prevent possible explosions from static electric sparks in rooms equipped with starch bucks or moguls, all belts and pulleys and parts of machines should be electrically grounded.

Employees are often seriously injured in attempting to remove starch from underneath a moving conveyor, or attempting to adjust trays on the conveyors of a mogul in motion. This should not be permitted.

Because the process of cleaning and molding the starch in a starch bolter may be accompanied by an explosive mixture of starch dust and air, it should be done only in a fire-resistant inclosure with good ventilation and without open lights.

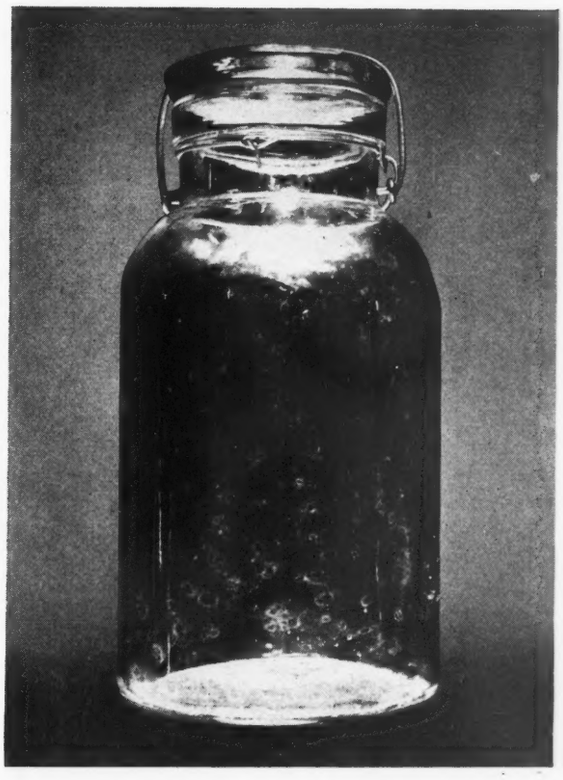
Many accidents have resulted from lack of protection of revolving shafts and gears of mixers and enrobers. Mixers and sheeters for rolling out dough in the bakery section should have substantial sheet metal coverings to protect the fingers of operators.

For protection against the metal rolls of a sizer machine, one manufacturer has provided a hinged metal shield which may be raised for cleaning. It is essential that a metal shield be provided for the revolving knives of a caramel-cutting machine. Because of interference by workers, caramel-cutting machines have proved difficult to guard fully. Hence only careful and experienced operators should be employed, and they should be warned never to attempt to remove caramel stuck to a knife while the machine is in motion.

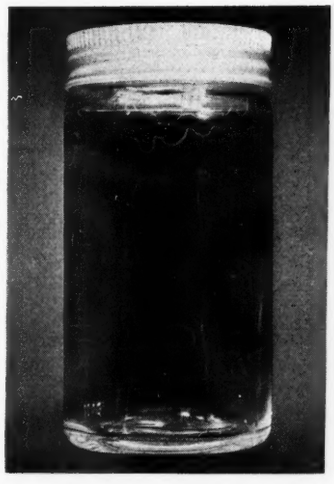


A SIZER with a wire-mesh guard over the rolls, protected gears, and an accessible safety switch

Jar in Which Valencia Almonds Had Been Kept Two Years in Cold Storage



Jar in Which Oleic Acid Had Been Smeared and Kept for Two Weeks at 37° C.



The Secret of the White Deposit on

GLASS CONTAINERS *of Nuts*

By E. K. NELSON and H. H. MOTTERN
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A WHITE DEPOSIT was observed in vacuum-sealed samples of shelled pecans packed in glass and also in certain lots of shelled almonds stored in glass containers. This deposit was present only at points where nuts came into contact with the glass. As the deposit renders the package more or less unsightly and suggests the possibility of a moldy condition, an investigation was undertaken to ascertain its nature.

A microscopic examination quickly showed that the deposit was neither mold nor bacteria. It was found to be insoluble in dry ether, chloroform or carbon bisulphide, but readily soluble in alcohol or water. An aqueous solution foamed somewhat on agitation, and when acidified, became turbid with the separation of oily drops, indicating that the deposit is a soap. This conclusion was confirmed by the strong alkalinity of the ash and the presence of sodium in it.

The shelled pecans were soaked over night in alcohol, the alcohol was then decanted and evaporated. The surface oil, which had been dissolved by alcohol, was found to have an acid number of 84.

The theory at once suggested itself that an alkaline cleaner had been used in washing the jars and had not been thoroughly removed, and that the surface fat of the shelled nuts, coming in contact with traces of alkali, had at once formed soap. Accordingly, experiments were made to test this theory. It was found, however, that the deposit formed even in jars which had been cleaned with bichromate and sulphuric acid cleaning solution, rinsed with distilled water, and dried.

Jars of ordinary glass, thoroughly cleaned, were then coated in spots with a thin film of oleic acid and kept for two weeks in a closet maintained at 37.5° C. Under these conditions a white deposit formed where the acid was in contact with the glass. This deposit with any excess oleic acid was removed with water and petroleum ether, and the aqueous solution, separated from the ether in a carefully cleaned separatory funnel, was concentrated to a small volume on the water bath in a clean, recently ignited, sodium-free platinum dish.

A drop of the concentrated solution on a microscope slide, acidified with hydrochloric acid, became turbid and oily drops separated. The rest of the solution was evaporated to dryness and ignited, and the aqueous solution, strongly alkaline to litmus, gave a strong sodium flame reaction.

Shelled nuts packed in containers of ordinary glass formed the white deposit, whereas nuts put up in Pyrex glass containers at the same time and under the same conditions formed no deposit. It was considered, therefore, that the white deposit is soap formed by the action of acid surface fat of the nuts on the alkali of the glass.

Each bag of coffee is sampled as received. Green coffee absorbs odors; therefore bags whose contents have objectionable odors are stored separately or rejected

The cutting belt

Continuous

COFFEE ROASTING

By EARL D. STEWART
Assistant Editor

FINE FLAVOR in vacuum-packed coffee depends on four factors, the most important of which is the proper selection of the coffees that go into the blend. Coffees from various countries—in fact, from different plantations in the same producing sections—nearly always show a wide variety of characteristics. There are but few coffees that by themselves offer cup excellence; hence, to give the coffee drinker a beverage that will suit his taste and to guarantee uniformity in the roasted product, year in and year out, it is necessary to combine or blend many lots of coffee.

The second factor upon which flavor depends is the degree of roast. Flavor is non-existent in unroasted coffee. It is roasting which brings about the chemical changes responsible for coffee flavor and aroma. Slight over-roasting or under-roasting is directly responsible for variations in the flavor of coffee.

The third factor is degree of granulation. The fineness of roasted coffee affects the rate of infusion and determines the strength of the finished beverage. A very fine or powdered coffee will offer more opportunity for the solvent action of boiling water than will one coarsely ground. Coffee is often pulverized for the sole purpose of producing strength but, in high-grade coffee, pulverizing has always been found to be injurious to flavor. Because coffee value is established by a satisfactory combination of aroma and strength, best results are obtained by a granulation that contains a proper proportion of both fine and coarse particles.

The fourth factor in the control of flavor is protection from air. Ground coffee deteriorates rapidly when exposed to air; it is oxidizable and the oils which contribute to the flavor are volatile. Vacuum packing makes it possible to retain indefinitely the original flavor, until the can is opened.

Recognition of these factors of coffee quality is based on the discriminating sense of taste and smell of skilled coffee testers. It is upon the highly specialized ability of these men that the modern coffee roasting and packing plant has been built.

The plant of Hills Brothers, San Francisco, is a 6-story brick and concrete building, occupying a prominent position on the Embarcadero, San Francisco's waterfront. Rising from the ground at the north side and surmounting the rest of the building, is a 10-story tower of attractive, architectural lines. Although it adds to the appearance of the entire structure, this tower is a strictly utilitarian addition, incasing the important mixing equipment.

Since coffee is such a variable product, brokers must submit samples for examination before purchase, in order that they may be tested to see that the coffee meets the requirements of the roaster. Quality is first determined by making an examination of the green berry, and later by cup-testing a roasted sample. The purchase of any lot of coffee is dependent on the satisfac-

tory result of this preliminary sample test. Then, upon arrival of a shipment in San Francisco, another sample is tested in the same manner.

If the consignment meets all requirements and passes this "ship-sample test," the bags of green coffee are delivered, by truck, to the plant. Here they slide down a metal chute to a shoulder-high platform in a pit roofed with frosted glass. This glass roof provides an evenly diffused light for the examination of samples, and the platform allows bags weighing 130 to 150 pounds to be transferred, without lifting, to two-wheeled hand trucks for transportation to storage stacks. A sampler, using a tryer, withdraws a handful of coffee from each bag as it comes into the plant and examines the samples closely. Thus, a thorough check is made on the entire shipment at the same time that an accurate composite for blending tests is obtained. After the samples are taken, the bags are weighed in lots of five, tagged with distinguishing marks, and stored.

The coffee testers prepare a blending chart for the foreman of the green-coffee warehouse and upon this chart the mixing on a commercial scale is based. A portable electric bag lifter elevates the bags to the main-line belt conveyor, which is located close to the ceiling, out of the way. This discharges the bags in an upright position on the "cutting belt," a conveyor slightly raised above the floor. As the bags move along this "cutting belt" at the rate of ten a minute, workmen cut the top seams and, at the end of their travel, the bags simply topple over and discharge their contents through a grating into a hopper leading to a bucket elevator. A workman removes the empty bag. Hard manual labor has been practically eliminated in this plant and, whenever possible, heavy loads are handled mechanically.

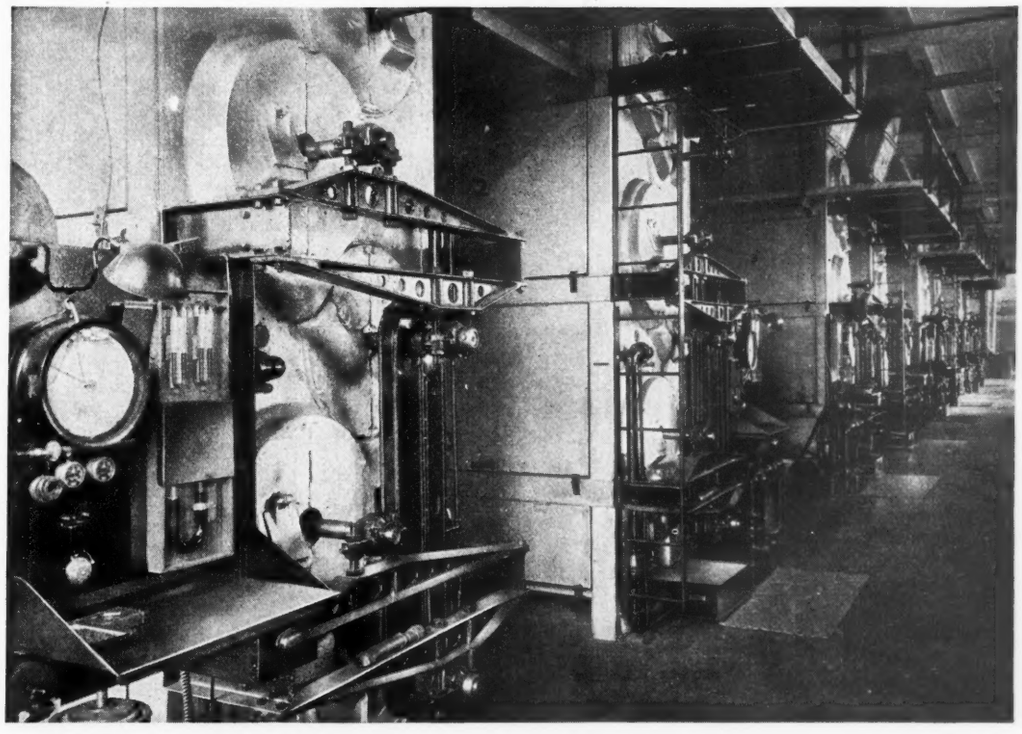
The bucket elevator then raises the coffee to the top of the tower of the building, about 140 feet above the ground. Here it is screened and fanned, to remove bits of string, lint from the bags, and other débris. The cleaned coffee is discharged into one of a series of small bins, feeding one of ten, large, steel, cone-bottom bins, which hold 1,600 bags each, and from these bins of coffee the final blend is made.

From the bottom of each bin a pipe leads to a mixing hopper, and here terminates in an automatic measuring gate. When the testers have determined the proportion of each kind of coffee needed for the blend, the gates are set to allow the green coffee from each bin to flow into the mixing hopper at rates proportional to the amount of each kind desired. It is only necessary to open the gate and let the coffee flow, for it has been found that the rate of flow is independent of the "head" of coffee in the bin.

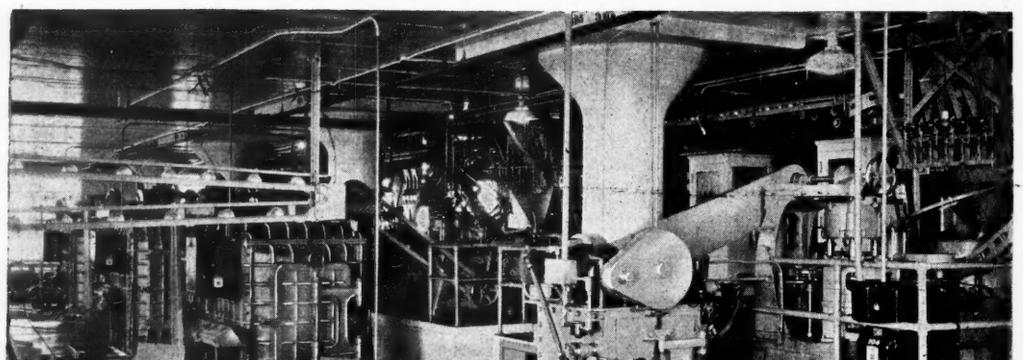
From the mixing hopper, a belt conveyor or a chute, depending on the location of the mixer, carries the blended coffee to a second elevator leading directly to the roasting floor, to supply bins, or to another hopper for bagging and storing as sacks of blended coffee. Aging adds greatly to the quality of coffee and it has been found that green coffee will continue to improve over a storage period of a year or more.

The "controlled roasting" process used in the Hills Brothers plant is a radical departure from the usual batch method in which several hundred pounds of coffee are roasted at a time. This embodies the advantages of continuous operation and automatic control in a unique way, at the same time permitting the product to comply with the manufacturer's claim that "foods cooked in small quantities taste the best." This is the only application of a continuous process to coffee roasting now in operation in large-scale commercial practice.

These controlled roasters consist of six superimposed iron cylinders, five of which are heated by gas flame. Air is drawn through the cylinders during roasting to remove fumes and smoke. The green coffee is measured into approximately 3-pound charges which travel successively through the roasting cylinders, beginning with the top one. These small charges follow each other continuously, and a steady flow of coffee passes through



A battery of "controlled roasters." They are gas-fired; the temperature is controlled by the recorder-controller seen at the left on the instrument board. Aluminum paint is used on the roaster housing to minimize radiation losses



Coffee packing machinery. The ground coffee, from second floor above moves from right to left through weighing and filling machine, loose clincher, vacuum sealer, and can polisher to can tester and packing tables to the left of the picture. Filled cartons are moving by gravity to sealing machines on floor below. Note the can conveyor near ceiling, and can and lid chutes at extreme right

the roaster in a small stream. The capacity of each roaster is 3,000 pounds an hour.

Control of the roast also is in the hands of expert testers, who determine, by cup tests at the beginning of a day's operation, what temperature shall be established in the roaster. This temperature, when set on a recording temperature controller regulating the gas flow, assures uniformity of the roast, although check tests are made throughout the day to guard further against any variation in the degree of roast.

On leaving the roaster, the coffee passes through a "stoner boot" and is lifted by air suction to intermediate bins; thence, it passes by pipes to the mills on the floor below. The "stoner," as its name implies, removes small stones, bits of iron, and other foreign material the specific gravity of which is too great to be lifted by the air suction that will raise the roasted coffee berries.

The mills grind the coffee to a standard of granulation that has been found by tests over a long period of years to give the most satisfactory results under all conditions. A quantity of chaff, amounting to less than 1 per cent of the weight of the coffee, is liberated during the grinding. Chaff neither adds to nor detracts from the value of coffee, but for the sake of appearance it is sifted and fanned from the coffee and blown into the firebox of a boiler in the basement. It provides sufficient fuel to generate heat and hot water for the entire building.

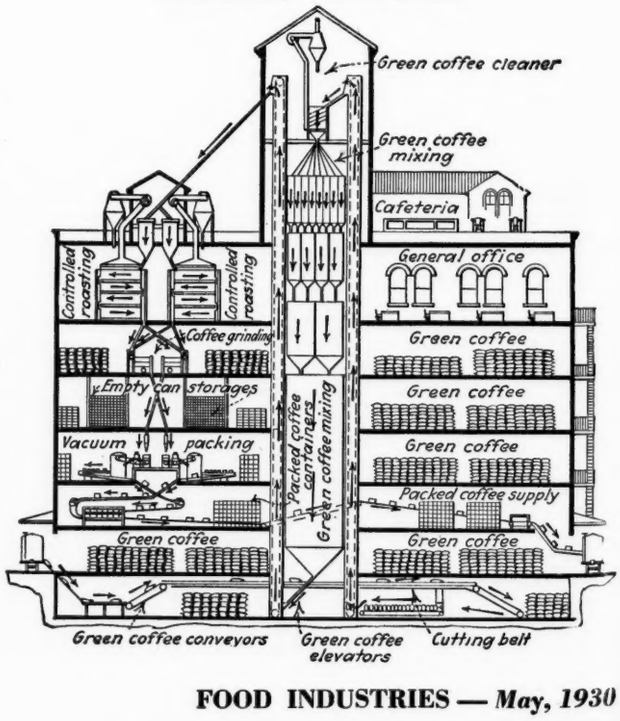
From the mills, the coffee goes by pipe ducts to the third floor for packing into cans. Attention might be called to the fact that the coffee is roasted on the sixth floor, ground on the fifth and vacuum packed on the third. The fourth floor contains storage bins for a reserve supply of cans. The coffee flows from each floor to the one below by gravity through a maze of pipes which might almost characterize the plant as a flour mill were it not for the all-pervading odor of coffee.

On the packing floor, the ground coffee is automatically weighed into vacuum cans. The vacuum packer consists of a double-seamer operating inside of a chamber built to withstand the external pressure produced by the high vacuum within. The vacuum is created by four motor-driven, direct-connected, dry, vacuum pumps, located in the basement.

The can end, which, as the cans are packed upside down, is the bottom, is loosely clamped on by a preliminary clinching machine, and the cans slide through an air lock into the vacuum chamber. As the cans leave the preliminary clinching machine, they are separated into two lines and enter the air lock at two places. The air lock is built somewhat like a steam-engine slide valve with two ports, one of which is open to the air, while the other is open to the vacuum chamber. Thus, while one can is entering the lock, another is entering the chamber for the extraction of air from the can and double-seaming. The sealed cans leave the vacuum chamber by a similar lock on the opposite side, are turned to an upright position, and slide down a short metal chute to pass through a cleaner, which removes any surface dirt and polishes each can.

One of the most recent developments in the plant is a testing machine through which each can passes after being cleaned. This tester might be called an "automatic

Diagrammatic cross-section of the plant, showing the path of the product



inspector," for it separates from the stream of cans any failing to hold a normal vacuum or any from which the opening key might have broken loose from its spot-weld. After being tested, the cans are packed into corrugated containers of various sizes by a specially built automatic casing machine. With this machine, one man does the work that usually requires from four to eight operators packing by hand.

The shipping containers move on gravity conveyors to the sealing department on the floor directly below. Here each box is closed and sealed by an automatic top-and-bottom-sealing machine and started on its way to the freight cars, or to storage pending shipment. By a system of switches in the gravity conveyors, the containers can be made to roll to any part of the warehouse.

A similar system of gravity conveyors leads from the warehouse stacks to the shipping platform on the first floor, and by means of portable sections mounted on casters, even into the freight cars themselves. One man can load a car without any walking or trucking from the shipping platform. He carries an electric cable into the car, and as the car is filled and the portable sections of the conveyor must be moved, he pushes a button on the end of the cable to stop the motors of a short power-driven belt conveyor on the warehouse floor, the line of cartons stopping until he is ready to start loading again. Much the same system is used to load motor trucks for local distribution.

Another interesting feature of the plant is the liberal use of counting machines. Bags on the cutting belt, cans leaving the vacuum sealing machine, packed containers entering and leaving the warehouse stacks, are all counted automatically. Even the small charges of coffee entering the roasters are counted by machines, providing a simple means for determining the quantity of coffee roasted during the day. Where exact figures are absolutely essential, as in car loading, two counters are used to check against each other. By combining and compiling readings of counters throughout the plant, the exact production figures for each day are easily determined and an accurate perpetual inventory is maintained.

The roasting operations of this plant call for the consumption of 46,000,000 cubic feet of gas each year. A connected motor load of 900 horsepower is required for operating machinery. The rate of production is illustrated by the fact that an empty can in a freight car on the west side of the building has been filled and loaded into another car on the east side in 14 minutes.

▼ ▼ ▼

The Rôle of MOLASSES *In Cookie Making*

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THE investigations reported in this paper were undertaken in order to determine some of the factors that affect the quality of molasses cookies, and to study different grades of molasses used in cookies.

According to the standards of purity for food products promulgated by the U. S. Department of Agriculture[1], "molasses is the product left after separating the sugar from the massecuite, melada, mush sugar, or concrete." The latter are products obtained by evaporating the purified juice of a sugar-producing plant or a solution of sugar to a solid or semi-solid consistency in which the sugar exists chiefly in a crystalline state.

Fitch[2] describes "true" molasses as the "mother liquor" from which the sugar has been crystallized. It contains, besides sucrose, some of the uncrystallizable sugar of the original juice and all the invert sugar produced in the process of manufacture, soluble impurities, nitrogenous elements, and mineral salts.

With the introduction of modern methods of sugar manufacture, including the use of vacuum pans and the centrifugal process, larger quantities of sugar are obtained in crystallizable form, but the molasses is more or less improvished and contains more impurities. There are three grades of molasses, depending upon the number of times sucrose has been removed from them by crystallization. Three crystallizations usually are made, and the molasses so produced is termed "first," "second," and "third" molasses, or "high-grade," "medium-grade," and "low-grade" molasses, there being also a lower grade, called "blackstrap."

In the dry state, it is readily observed that first, or high-grade, molasses contains a relatively high percentage of sucrose and that the sucrose content decreases with each extraction of sugar. In like manner the dextrose, levulose, and acid content increase.

According to Daniels and Heisig[3], "the acid reaction of molasses is due to small amounts of inorganic acids; namely, glycolic, oxalic, malic, succinic, and tannic, which remain after the lime is added in the process of purification of the cane juice. The amount of acid is comparatively little, since an excess would result in a smaller yield of sucrose through the hydrolytic action of the acid. The acid content of the different brands varied slightly,

[1]U. S. Dept. of Agr. Definitions and Standards for Food Products. S. R. A. F. D. No. 2, Rev. 1; 1928.

[2]Fitch, Wm. E.; "The History and Use of Molasses"; *Am. Food Jour.* 19: 205-207; 1924.

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[3]Daniels, Amy L., and Heisig, Esther H.: "Acidity of Syrups Used in Cookery"; *Jour. Home Econ.* 11: 193-199; 1919.

0.5 to 0.64 per cent for the brands tested, depending somewhat upon the methods of treatment during the purification process and subsequent handling. Obviously, the amount of cooking soda which should be used with these molasses varies slightly, but in order that there may not be an excess of alkali in products containing molasses, it seems best to meet the requirements of the least acid, since it is not practical to use a different proportion for each brand."

In judging molasses for baking purposes, Taussig[4] states "that the color of baked goods and not the color of the molasses should be the final criterion." Low-grade Louisiana or blackstrap molasses, because of the sulphur dioxide, will make the product very dark; molasses from immature sugar cane bakes out with a greenish tinge. Taussig also states that "to the commercial baker, 'the effective sweetness' of a molasses or the amount of sugar that may be eliminated from the dough is an important factor."

In this study seven brands of molasses, as shown in Table II, were used. These included representative samples of high, medium, and low grade. The following basic formula was used in the experiments.

	Grams
Flour, bread	220
Molasses	130
Sucrose (pulverized granulated sugar)	20
Shortening (all-hydrogenated fat)	35
Whole egg	36
Salt	2
Sodium bicarbonate	0 to 5

The variants used are stated in each experiment.

The ingredients were combined as follows: The shortening, sucrose, and salt were creamed. The egg was beaten with 30 revolutions of a rotary egg beater and stirred into the creamed mixture. The molasses was then added, and the whole was stirred lightly. The sodium bicarbonate was thoroughly mixed with 100 grams of the flour by sifting three times, and this was combined with the creamed mixture. A second 100 grams of flour was added, stirring as little as possible to form a smooth dough. The remaining 20 grams of flour was used on the board to prevent sticking during the rolling and cutting process, being ultimately worked into the dough. Two steel bars 3 millimeters ($\frac{1}{8}$ inch) thick were used as guides for rolling the dough. A cookie cutter 54 millimeters ($2\frac{1}{8}$ inches) in diameter was used. The cookies were transferred to flat sheets of tinned iron, 48 cookies constituting the usual batch. These were baked in an automatically regulated gas oven according to time and temperature given in each experiment. The tins were removed from the oven and allowed to cool with the cookies in place.

The spread and height of representative cookies of each series were noted. The spread, or increase in diameter, was determined by placing twelve cookies in a straight row and recording the difference between the unbaked and baked cookies. The height was measured by placing the same twelve cookies one on top of the other and recording the difference between the unbaked and baked cookies.

Representative cookies of each series were appraised by expert judges according to the grading and scoring sheets on pages 204 and 205.

Experiment I: Influence of Sodium Bicarbonate on the Characteristics of Molasses Cookies—Two variants, molasses and sodium bicarbonate, were used in this experiment. All other factors were stabilized. The cookies were baked for 6 minutes at 450° F. (232° C.) The time and temperature were taken from former experimental work on cookies, as being the best until the correct proportion of sodium bicarbonate had been determined.

The six samples of molasses used varied widely: two were high grade, two medium grade, and two low grade. The quantity of sodium bicarbonate varied from 0 to 5 grams to each 130 grams of molasses. The actual quantities in the seven batches made with each molasses contained accordingly 0, 0.5, 1, 2, 3, 4, 5 grams, respectively.

Doughs with no sodium bicarbonate were much lighter in color than those in which this ingredient was included. The intensity of the color increased as the quantity of sodium bicarbonate was increased. One low-grade molasses with no sodium bicarbonate gave the dough a green color, which tended to disappear as sodium bicarbonate was added, and the dough became darker.

The spread and height of the cookies increased in keeping with increases in the quantity of sodium bicarbonate in the dough (see Tables III and IV). The cookies containing more than 3 grams of sodium bicarbonate to each 130 grams of molasses increased considerably in height at the beginning of the baking period and fell near the end of the period. Also, they had a large spread the first part of the baking period, but shrank near the end.

[4]Taussig, Charles Wm.: "Molasses, Syrups, and Honey (Criterion for Judging)"; *Cracker Baker* 13:45-46; 1924.

SCORE CARD FOR CRISP MOLASSES COOKIES

Number of Cookie _____

Judge _____

Factors	5	4	3	2	1	Judge's Score
COLOR	Excellent	Good	Fair	Poor	Objectionable	
Texture	Excellent	Good	Fair	Poor	Objectionable	
Aroma	Excellent	Good	Fair	Poor	Objectionable	
Flavor	Excellent	Good	Fair	Poor	Objectionable	

Note: Kindly judge without discussion.

Directions: Encircle the words that give your opinion of each factor.

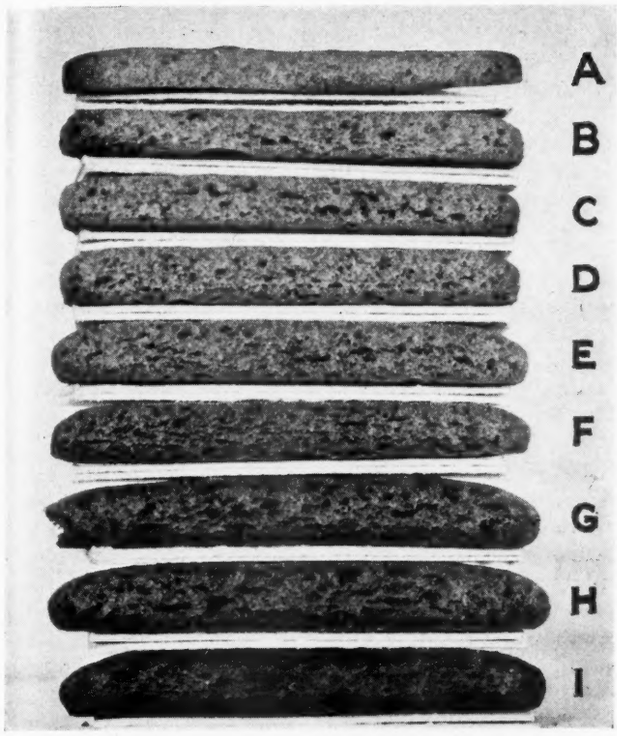


Fig. 1—Cross-section of molasses cookies with varying amounts of sodium bicarbonate per 130 grams molasses:

A. 0.0 g.	D. 2.0 g.	G. 5.0 g.
B. 0.5 g.	E. 3.0 g.	H. 10.0 g.
C. 1.0 g.	F. 4.0 g.	I. 15.0 g.

The under-surface of the cookies containing no sodium bicarbonate was very dull. It became smoother and more shiny as the quantity of sodium bicarbonate was increased. The cookies containing no sodium bicarbonate baked unevenly; the edge and under-surface became dark and the center top remained much lighter in color. The color was more even as the quantity of sodium bicarbonate was increased.

The flavor of the molasses was too pronounced in the acid cookies; with sodium bicarbonate in excess the flavor of the alkali was too pronounced; the correct quantity of sodium bicarbonate becomes imperative if the best flavored cookie is to be obtained. The odor of molasses was pronounced in the acid cookies, becoming milder as the quantity of sodium bicarbonate was increased.

The texture was fine and compact in the excess-acid cookies, but very coarse and crumbly in the excess-alkaline cookies, both extremes being undesirable.

According to the judges' scoring, the high-grade molasses produced the best cookies in respect to appearance, flavor, and aroma. The texture was influenced more by the quantity of sodium bicarbonate than by the quality of molasses used. The cookies containing 3 grams of sodium bicarbonate to each 130 grams of molasses were judged superior in every instance. The hydrogen-ion concentration of these cookies varied between pH = 7.5 and pH = 8.4, the majority falling within the range of pH = 7.7 and pH = 8.1.[5] The hydrogen-ion potentiometer was used for the hydrogen-ion determination.

Experiment II: Influence of Time and Temperature of Baking on the Characteristics of Molasses Cookies—In this and following experiments only high grade molasses was used. After determining the optimum amount of sodium bicarbonate to use in the formula, baking experiments were conducted with the time of baking and the temperature of the oven as the variants. The same formula was used throughout, the sodium bicarbonate being held at 3 grams. The temperature varied from 400° F. (204° C.) to 550° F. (288° C.) by intervals of 25°; seven temperatures in all. The baking time varied from 2 to 20 minutes, depending upon the temperature.

As the time of baking and the temperature were increased, the baked cookies became darker. Those baked at a low temperature for a short time were rubbery and doughy; at a low temperature for a long time they were hard and dry. Cookies baked at a high temperature for a long time became very dark; in many instances, burnt. The flavor was affected with the texture. There were no appreciable differences in the increase in spread or height of the cookies.

In respect to appearance, texture, flavor, and aroma, the judges selected cookies baked at 475° F. (246° C.) for 5 minutes as being the best in the experiment. This time and temperature were used in the following experiments. The alkalinity of the cookies baked at 475° F. for 5 minutes also came within the range of pH = 7.7 and pH = 8.1.

Experiment III: Influence of Allowing the Doughs to Stand on the Characteristics of Molasses Cookies—For this and the following experiments the quantity of

[5]See *Cereal Chemistry*, 5; 256-268; 1928.

GRADING SHEET FOR CRISP MOLASSES COOKIES

Number of cookie _____ Date _____

Judge _____

		Characteristics			
APPEARANCE SHAPE		Even	Slightly uneven	Uneven	Very uneven
TOP	Very smooth	Smooth	Slightly rough	Rough	Very rough
Under-SURFACE		Even pores	Slightly uneven pores	Uneven pores	Very uneven pores
	Very small pores	Small pores	Medium pores	Large pores	Very large pores
	Glassy	Shiny	Slightly dull	Dull	Very dull
COLOR		Even	Slightly uneven	Uneven	Very uneven
	Very dark	Dark	Medium dark	Light	Very light
TEXTURE		Even	Slightly uneven	Uneven	Very uneven
	Compact	Fine	Medium fine	Coarse	Very coarse
	Hard	Crisp	Slightly soft	Soft	Very soft
	Very tender	Tender	Slightly tough	Tough	Very tough
	Not crumbly	Slightly crumbly	Crumbly	Very crumbly	Intensely crumbly
FLAVOR	Very pronounced	Pronounced	Slightly pronounced	Mild	Negative
AROMA	Very pronounced	Pronounced	Slightly pronounced	Mild	Negative

Directions: Encircle the words which in your opinion most nearly describe the characteristics of the cookie.

sodium bicarbonate was held at 3 grams. Two series were conducted in this experiment:

1. Influence of allowing the dough to stand, before rolling, at room temperature, 70° F. (21° C.), for 0, 0.5, 1, 2, and 3 hours.

2. Influence of allowing the dough to stand 0, 0.5, 1, 2, 3, 6, 9, 12, 24, 48, 72, 96, 120, 144, and 168 hours in an electric refrigerator set at 40° F. (4.4° C.).

The most noticeable effect of standing was the ease with which the doughs could be handled. Doughs standing at room temperature, 70° F. (21° C.), dried and a crust formed on the exposed surface. The doughs in the refrigerator at 40° F. (4.4° C.) did not adhere to the mixing board or rolling pin as readily and were more easily rolled than those that stood at 70° F. (21° C.). The cookies from the doughs standing at 40° F. (4.4° C.) kept their shape better and were more easily transferred to the baking sheets than those cut from doughs standing at 70° F. (21° C.). After the doughs had stood beyond the optimum period, they became more difficult to handle, being very hard and stiff. The ease in handling was undoubtedly due to the hardening of the fat. The size of the batch of dough would have some effect upon the optimum time for the dough to stand.

Under the specified conditions and with the given formula, 24 hours in an electric refrigerator at 40° F. (4.4° C.) seemed to be the optimum time for the dough to stand. At this temperature the dough was chilled, but not hard, and was easily handled and rolled. According to the judges' scores, the cookies of this dough were selected as the best in the experiment in respect to appearance, texture, flavor, and aroma.

Before the optimum period was reached, effects upon the color, flavor, texture, aroma, spread, or height were not appreciable. Beyond the optimum period the cookies became increasingly poorer, being dry, coarse, and tough, and the flavor and aroma less desirable. In addition, the spread decreased and the height increased. Standing seemed to have little effect upon the alkalinity of the baked cookies, that of all the cookies being within the range of pH = 7.5 and pH = 8.4.

*Table I—Composition of Grades of Molasses—Fitch and Owen**

Constituents	First Molasses Per Cent	Second Molasses Per Cent	Third Molasses Per Cent	Blackstrap Per Cent
Water	20.0	20.0	20.0	18.5–23.5
Sucrose	53.6	41.7	31.7	34.2–36.6
Dextrose	8.76	12.2	15.0	29.7–32.0
Levulose	8.00	12.5	16.5	
Albuminoids	0.2	0.25	0.38	.....
Amids	0.94	1.50	2.00	.....
Acids, gums	4.50	6.50	6.30	.....
Ash	4.00	5.35	6.30	3.4– 6.4
Undetermined	.....	.....	.....	3.5– 8.0

*Owen, Wm. Ludwell; "Cane Syrups and Molasses, Their Composition; Production and Consumption in the United States"; *Planter* 74, 168-170; 1925.

*Table II—Analyses of Molasses Used for Experimental Work**

Source of Stock	Grade	Sucrose Per Cent	Invert Sugar Per Cent	Total Sugars Per Cent	Total Solids Per Cent	Ash Per Cent	Acidity† cc N/10 NaOH
Imported							
West Indies	High grade	40.9	28.8	69.7	75.2	2.02	30
West Indies	Medium grade	38.9	25.3	64.2	75.3	3.72	40
West Indies	Low grade	37.9	22.8	60.7	75.3	4.94	90
Domestic							
New Orleans	Medium grade	42.1	19.4	61.5	74.9	5.95	75
New Orleans	Low grade	35.8	22.0	57.8	76.4	7.22	90
New Orleans	High grade	42.9	20.5	63.4	74.5	3.77	90
Imported							
West Indies	High grade	42.0	22.5	64.5	73.2	2.1	60

* Analyses made by G. N. Bruce, Technical Bureau, Biscuit and Cracker Manufacturers' Association.

† Expressed in terms of cubic centimeters of N/10 NaOH to neutralize the acid in 100 grams of molasses.

Table III—Effects of Varying Quantities of Sodium Bicarbonate on the Increase in Spread of Molasses Cookies Made With High-, Medium-, and Low-Grade Molasses

Sodium Bicarbonate Grams	Spread — High Grade Molasses Sample 1 mm.	High Grade Molasses Sample 2 mm.	Medium Grade Molasses Sample 1 mm.	Medium Grade Molasses Sample 2 mm.	Low Grade Molasses Sample 1 mm.	Low Grade Molasses Sample 2 mm.
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.5	12.7	12.7	11.1	9.5	12.7	12.7
1.0	15.8	19.0	12.7	15.8	15.8	19.0
2.0	15.8	25.4	15.8	19.0	19.0	22.2
3.0	19.0	31.7	19.0	25.4	19.0	25.4
4.0	25.4	38.1	28.5	28.5	28.5	28.5
5.0	28.5	47.6	38.1	34.9	38.1	32.8

Table IV—Effects of Varying Amounts of Sodium Bicarbonate on the Increase in Height of Molasses Cookies Made With High-, Medium-, and Low-Grade Molasses

Sodium Bicarbonate Grams	Height — High Grade Molasses Sample 1 mm.	High Grade Molasses Sample 2 mm.	Medium Grade Molasses Sample 1 mm.	Medium Grade Molasses Sample 2 mm.	Low Grade Molasses Sample 1 mm.	Low Grade Molasses Sample 2 mm.
0.0	15.8	17.4	15.8	15.8	15.8	15.8
0.5	36.5	34.9	31.7	30.1	22.2	31.7
1.0	38.1	38.1	34.9	34.9	31.7	34.9
2.0	41.2	41.2	34.9	38.1	34.9	38.1
3.0	42.8	44.4	36.5	41.2	34.9	39.6
4.0	44.4	46.0	36.5	44.4	38.1	41.2
5.0	47.6	47.6	36.5	44.4	41.2	42.8

Summary — High-grade molasses produced better cookies in respect to color, flavor, and aroma than medium or low grades. The grade of molasses did not greatly influence the texture.

The quantity of sodium bicarbonate, as increased from 0 to 5.0 grams to each 130 grams of molasses, affected the cookies in many ways. The under-surface became more shiny as the quantity was increased, and cookies baked more evenly with a more uniform color. Without sodium bicarbonate the edge and under-surface became dark and the center top remained much lighter; the spread and height of the baked cookies were increased as the quantity of sodium bicarbonate was increased. The texture was changed from fine and compact to coarse and crumbly as the sodium bicarbonate was increased. The most desirable texture was found in cookies with pH values between 7.5 and 8.4, the range obtained when 3 grams of sodium bicarbonate to 130 grams of molasses was used.

The flavor of the cookies was influenced by the grade of molasses, the quantity of sodium bicarbonate, and the time and temperature of baking. The best cookies were those made with high-grade molasses, with pH values between 7.5 and 8.4, and baked at a high temperature, 475° F. (246° C.), for 5 minutes. Excess acidity or alkalinity produced an undesirable flavor.

The molasses aroma was more pronounced in acid than in alkaline cookies. The intensity of the aroma decreased as the alkalinity increased, the most desirable aroma being found in cookies with pH values between 7.5 and 8.4. Cookies baked at 475° F. (246° C.) for 5 minutes were the most desirable.

Cookie doughs that stood in the refrigerator at 40° F. (4.4° C.) for 24 hours under the given conditions did not adhere readily to the board or rolling pin, and consequently were more easily rolled, cut, and transferred to the baking sheets than those that did not stand in the refrigerator. The optimum time for standing depends upon the size of the mix. As the doughs stood beyond the optimum period, the spread decreased and the height increased.

ACTIVATED CARBON:

A Modern Purifying Agent

By CHARLES L. MANTELL
Consulting Engineer
New York City

TO THE general public, the color of a product is still the indicator of its purity. Even from the technical viewpoint it is curious to realize how widely this generalization holds true and how many products we strive to make as colorless or as white as possible. This visible standard for purity has led to a tremendous expansion in the use of decolorizing carbons. As inferior materials generally are incapable of being acceptably decolorized or whitened, this standard actually is a mark of purity.

Up to about ten years ago the usual purification methods for decolorizing and deodorizing were:

1. Chemical bleaching of the colored impurities in solution.
2. Distillation of liquids, leaving impurities in the still.
3. Recrystallization of solids.

In the first method the oxidizing or reducing agent employed did not remove the impurities from the solution but merely changed their condition. Any excess of the reagent used remained in the solution. Its disadvantages are obvious, for although the appearance of the material was improved, its actual purity was impaired.

The second method is an expensive one, entailing losses of products, as varying amounts must be left in the undistilled residue to insure complete retention of impurities in the still.

Regarding the third method, if losses of mother liquor are to be avoided, the use of recrystallization is limited. It is at best tedious and wasteful of floor space and time. There always is the probability that small quantities of coloring matter and impurities will be carried down by the crystals as they form.

The use of activated carbon offers a simple means of replacing the older purification methods. Adsorption of impurities by carbons has shown marked monetary savings over other purification processes, because of the great progress made in the direction of increasing adsorptive power per unit of cost. In addition, it has been possible in many instances to purify liquids and solutions that did not respond to other methods of treatment.

Since the fifteenth century it has been known that charcoal, made by burning wood in closed vessels, possesses the power of removing colors from solutions. Wood charcoal has been employed for many years to remove undesirable odors. Scientific development in the past twenty years has produced "activated carbons" hundreds of times more effective than crude charcoal.

Bone black or char, the carbonaceous residue from the dry distillation of animal bones in closed vessels, is a key material in the purification of raw sugar, the annual production of which is over 5,000,000 tons in the United States alone. As decolorants, the present-day activated carbons are 20 to 50 times as efficient as bone char. It is often stated that the future will bring forth the replacement of bone char in the sugar industry by activated vegetable carbons.

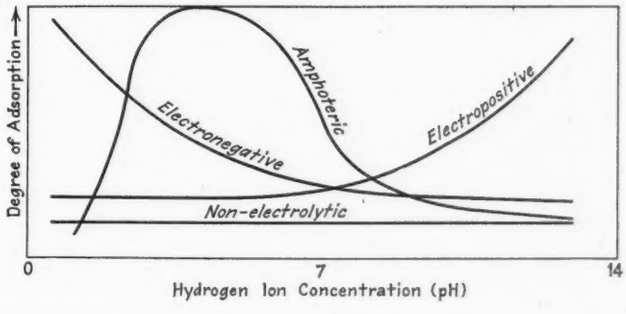
Many processes for the manufacture of activated carbons have been patented. Almost any vegetable substance can be converted into a decolorizing char by the action of heat and chemical reagents. If vegetable materials be carbonized in closed vessels, the resulting carbon is inactive—that is to say, it does not possess marked decolorizing power. It is believed that the active surface of the carbonized product is masked by complex materials, such as hydrocarbons deposited on the surface, and that these materials lessen the power of the carbon to combine with other substances. Their removal constitutes activation.

A method widely employed for removal depends upon oxidation by means of gases, such as air, steam, carbon dioxide, chlorine, or similar materials. The hydrocarbons and non-active materials are slightly less resistant to oxidation than is the active carbon. By a proper adjustment of the temperature and concentration of the oxidizing material, the adsorbed hydrocarbons may be effectively removed. Other methods of activation may depend upon the use of various chemicals for disposing of the inactive constituents of the original material.

Most of the commercial carbons appear in the form of black, fine powders. As they are found on the market their characteristics vary widely, some of them being neutral, some acid, and some alkaline, depending upon their method of manufacture and their intended use. Activated carbons remove colors, odors, and unwanted flavors from solutions and gases by adsorbing the undesired impurities on their surfaces. It is estimated that 1 cubic inch of a good carbon will have a surface of over 20,000 square yards.

A large number of testing methods have been developed in an attempt to evaluate the carbons. The so-called standard methods of judging carbons have little practical value. In the present state of our knowledge, data

The degree of adsorption of activated carbon may depend on pH value.



regarding the action of carbons on one solution cannot be applied to another, but each one to be decolorized must be tested separately. The adsorption of color by carbon has been shown repeatedly to be affected by materials in the solution, other than coloring matters, which assist or take part in the process. In general, carbons can attract and retain anything in a liquid that constitutes an impurity, particularly if that substance be of higher molecular weight than the substance in which it occurs, or if it be in the form of colloids which can be adsorbed on the surface of the carbon. The adsorbing power of carbons in general varies directly with the amount of active surface per unit of weight.

When a liquor containing impurities is brought into contact with a carbon, the attraction of the carbon for the impurities is greater than the attraction of the liquor for the impurities. The carbon therefore adsorbs the impurities—coloring matter, odor, flavor, and the like—until equilibrium is reached, after which the carbon will remove no more of these substances from that particular solution. If at this point the carbon and liquor be separated and the carbon introduced into a further quantity of the original—or a darker—liquor, more impurities would be taken up by the carbon until a second equilibrium was reached. A smaller quantity of impurities will be taken up in the second use of the carbon than in the first, and if a third use be made, smaller quantities will be taken up than the second time.

Theoretically, this practice of using the "reserve power" of the carbon can be repeated a number of times, but in use the economic mechanical and operating factors determine the manner of employing the carbon and the number of times it may be used. By suitably decreasing the quantities of liquor with which the carbon comes in contact in each successive use—which is, in effect, successively increasing the proportion of carbon employed—the per cent of impurities removed becomes the same. In this way three separate lots of liquor, each smaller than the preceding one, are all decolorized to the same degree.

The rate of removal of impurities from a solution by carbon is very rapid during the first interval of contact, gradually reaching a point where increased time of contact gives no further decolorization. Color removal usually is greater at higher temperatures. With both time of contact and temperature fixed, the per cent of total impurities removed varies directly with the per cent of carbon used. If two solutions, one of which contains a much greater amount of impurities than the other, be treated in the same manner in respect to time of contact of the solutions with carbon, temperature, and quantity of carbon per unit weight or volume of solution, the more dilute solution will have a greater percentage of its total color or impurities removed by the carbon.

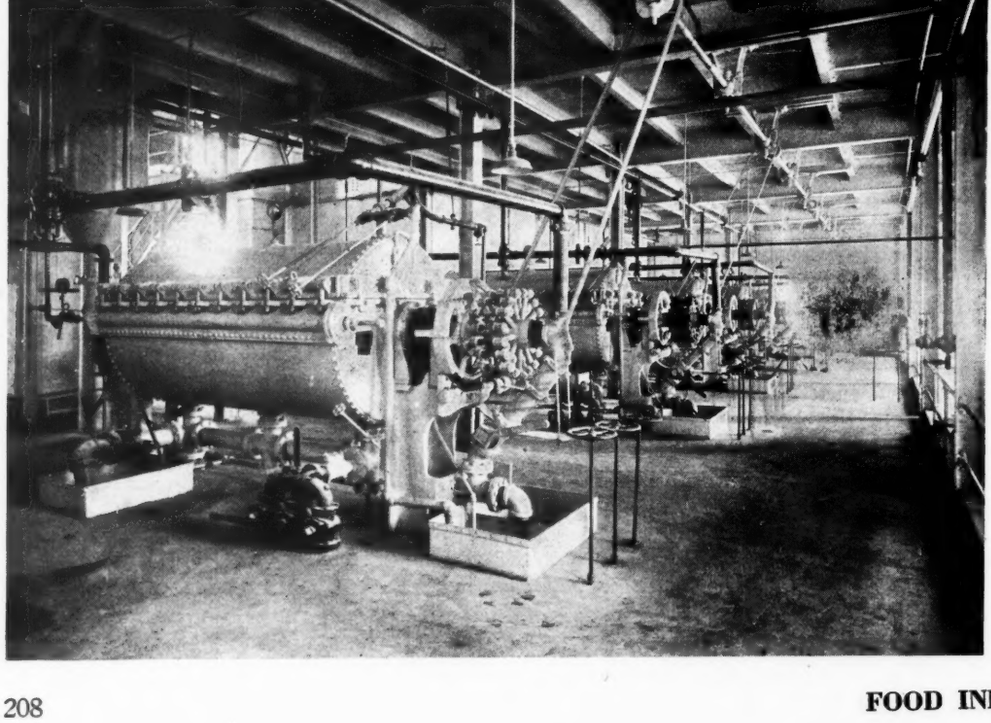
The majority of colored materials encountered in industry are negatively charged, and ordinary carbons will give greater decolorization with increase in acidity of the solution. Both the carbon and the impurity to be removed carry electrical charges. Results show that in general the adsorption efficiency of carbons is dependent largely on the difference in electrical charges between the carbon and the particle, colloid, color, or ion to be adsorbed. The generalized curves in the accompanying figure show the relation between acidity, neutrality, and alkalinity of the solution and adsorption by chars of substances having various electrical properties.

It will be noticed that the adsorption of non-electrolytic materials, such as sugar, is unaffected by acidity or alkalinity. Electropositive materials—colors like ponceau red—are taken up more effectively in alkaline solution, while electronegative materials—colors like methylene blue and most colored impurities—are most effectively removed from acid solutions.

Amphoteric substances—colloids, proteins, and some natural colors—which may act either as acids or as bases, depending upon the acidity of the solution, are adsorbed effectively near the point where they show neither acid nor basic properties.

In commercial practice we cannot often obtain the optimum conditions for most effective adsorptions, as other undesirable effects will enter. For example, decolorization of sugar solutions is more effective in acid solutions, but the acidity would cause inversion losses in sugar.

Intimate contact must be provided between the carbon and the liquid to be treated; after treatment the carbon, now containing the impurities, must be separated from the liquid. In the simplest manner — and the poorest from the viewpoint of engineering and efficiency of material and equipment—both operations can be accomplished at the same time. The carbon can be held in a bed or in a tank and the liquid passed through it, as, for example, the bone



These five filters for removal of activated carbon from the purified sirup have a capacity of 250 tons of refined sugar per 24 hours.

char filter in a sugar refinery. This method, however, has the disadvantage that very large quantities of carbon must be used. Moreover, the first product from the filter is very good, but the quality decreases until it is too poor to be acceptable. In this filter we have a very large amount of decolorizing solids in proportion to the amount of liquor being treated.

As bone char is used in granular form, only the surface of the granules are employed effectively, leaving the bulk of the adsorbent inaccessible and out of action. On the other hand, the finely powdered activated carbons have a very much greater active area available and in contact with the product being treated.

In the preferred method, the carbon in small quantities is stirred into the liquor under treatment, intimate contact being obtained between every particle of carbon and the liquor. After treatment, the carbon with its adsorbed impurities is allowed to settle and the purified liquor drawn off; or else the whole mixture of carbon and liquor is passed through a filter or filter press, the carbon and impurities being held in the filter, and the purified liquor passing on. Thus only small quantities of carbon are very effectively used, only relatively small equipment performing in an efficient manner, with resultant lower treatment costs. This so-called "contact" method is now preferred in most industries from the standpoint of engineering, maintenance of uniform quality, and ease of operation.

The manner of using activated carbons is a simple one. The liquor to be treated is thoroughly mixed, brought into close contact with a quantity of carbon previously determined by a laboratory test, the mass brought up to the most suitable temperature, and agitated for 15 to 30 minutes. The carbon, now holding the impurities firmly adsorbed on its enormous surface, is removed from the liquor by settling or simple filtration.

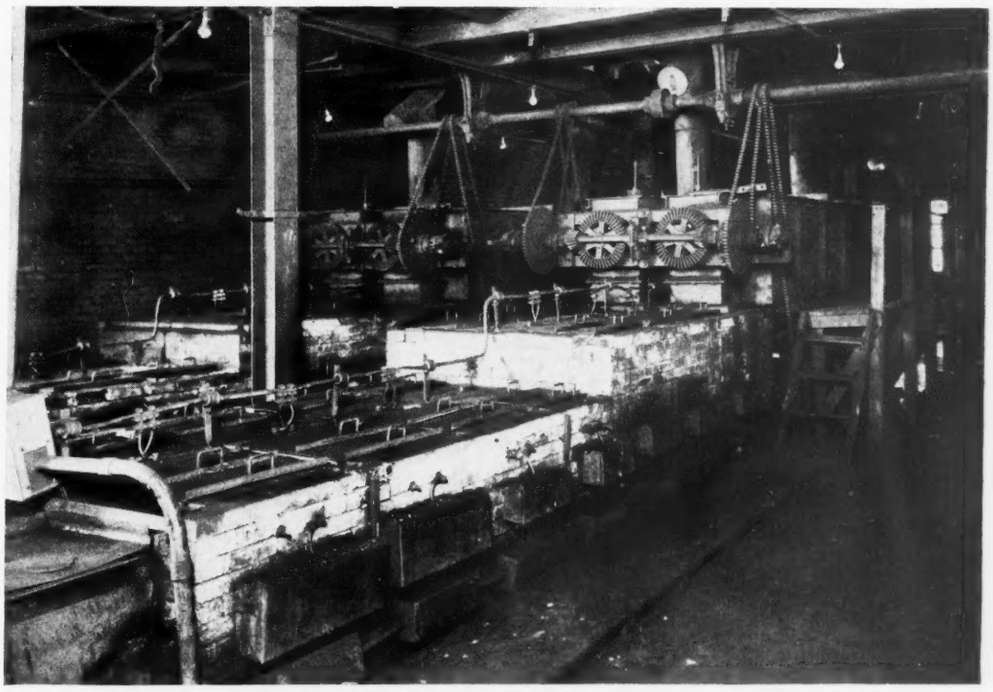
One of the most important single fields for the use of activated carbons is the sugar-refining industry. In Europe, activated carbons are widely used in the manufacture of beet sugar. The necessity for producing a superior quality of sugar from this source which will enable it to compete on an equal footing with cane sugar has compelled American manufacturers in recent years to consider the use of carbons in the domestic industry. There is little doubt that the near future will see activated carbons in universal use in the American beet sugar industry.

An even more important application of activated carbons lies in the refining of cane sugar. The method of manufacturing cane sugar which has been considered standard practice for several generations, has been to prepare raw sugar in the tropics where the sugar cane is grown, to bag this raw sugar and ship it to refining centers in the temperate zone where the raw sugar is washed, melted, and then purified by gravity filtration over larger volumes of granular bone charcoal. The washing and reactivation of the bone charcoal after use involves the consumption of large quantities of water and fuel, both of which are scarce in tropical countries. For this reason, it has hitherto been impossible to refine in the tropics, so that the uneconomical procedure of bagging the sugar and shipping it to a distant point, with the resultant double handling and chemical and physical losses, has been necessary.

Earlier attempts to refine in the tropics with activated carbons met with only partial success. The purification of the sugar was satisfactory, but the mechanical details of filtration, as well as the process of reactivating the carbon after use, had not been properly and efficiently worked out. During the last six years, however, a refining process which uses an activated carbon has met with growing success. The method of handling the sugar melt and the reactivation of the carbon in an electric furnace of special design have been worked out in great detail. In its present stage of development, the process appears to be both simple and efficient. Several installations in various parts of the world are now in operation. The sugar produced in these tropical refineries is being sold in various markets in competition with the best grades of bone char sugar, and is commanding equal prices.

A further development of larger interest, and one which may have a revolutionary effect upon the marketing of sugar, is the production of refined sugar in sirup form. The application of activated carbon has enabled the manufacturer to produce a white sirup that can be used in place of a solution of refined granulated sugar. The sirup is shipped in tank cars or tank trucks, and is pumped to a distributing tank in the user's factory, from which it can be distributed by pipe lines.

In part 2 of this article, the use of activated carbon in treating vegetable oils, glycerin, water, and a number of other products will be discussed.



Dryer and revivifier for activated carbon. The revivified carbon which emerges is equal to virgin carbon in decolorizing ability and filtering qualities.

CHINA

As a Market for American Foods

By **WALTER BUCHLER**
New York City

NAPOLEON, so the story goes, once called China a sleeping lion. To the mind of a warrior, the latent power of this mighty nation was aptly symbolized by the strong jaws and destructive teeth of the king of beasts. He recommended that the slumberer be left undisturbed.

But we have not done so. The light of industrial progress has been turned more and more brightly into its eyes. Despite the blinking, the frequent dozing spells, and the creak of joints stiffened by long inaction, the lion is waking. The mouth that Napoleon feared is still there, but for us it has a new significance. It represents the collective hunger of 500 million people—not necessarily a physical hunger, common though that has been, but a potential dissatisfaction with the bare necessities of life that, hand in hand with even the slightest economic advance, is opening a vast market for new imports.

Among the commodities already going into this market, foodstuffs from America occupy a prominent place. Staples of the least expensive sort, of course, constitute the bulk of such trade as yet. As time goes on, however, quality and variety in foodstuffs, as well as the nourishment necessary for existence, must come into the consideration of an ever-increasing percentage of China's people. Increasing percentages of imported foods will be necessary to supply this demand.

Rice, wheat, beans, corn, millet, and sweet potatoes constitute the principal staples in the foods of the Chinese. Despite the preponderance of rice in Chinese diet, wheat is becoming more and more popular among an increasing number.

Although China herself produces annually about 600 million bushels of wheat and has more than 160 flour mills equipped with the most modern machinery, more and more wheat flour is imported each year. Not only is the imported flour preferred by the Chinese, on account of its superior quality, but frequently it is lower in price.

DeCou from Ewing Galloway

Even on streets as typically oriental as this, American goods occupy a place

The demand for imported wheat is not so assured as that for flour, and depends largely on the condition of crops and communications, and prices prevailing in China. Imports into China during recent years were as follows:

	Wheat			Wheat Flour		
	1926	1927	1928	1926	1927	1928
U. S. A.	$2,167,504	1,121,871	304,590	5,988,800	4,766,520	5,973,940
Canada	9,899,760	3,745,665	2,065,390	3,982,400	2,673,060	4,569,560
Japan	.....	.....	.....	6,621,640	4,346,310	6,624,300
Total, including all others	13,753,400	4,868,364	2,370,690	17,072,496	14,702,865	22,339,937

Shanghai is the center of the flour-milling industry in China and has the largest and best equipped mills. Although most of the imported wheat goes there, Hankow, Tientsin, Harbin, and Tsinan also are large flour-milling centers. Tientsin, Dairen, Canton, New-

chwang, Tsingtao, Amoy, and Shanghai are the principal ports importing flour, and it is on them that those interested in shipping wheat and flour should concentrate their energies as far as the Chinese market is concerned. Those who supply flour-milling machinery also will find scope for their specialties in this market, as the present tendency is to erect more and more mills in various parts of China.

Canned foods are now extensively consumed throughout China, both by the well-to-do and the poor. Due to lack of sanitary supervision and scientific principles, the quality of such goods made in Chinese canneries is not particularly good. The result has been that although the ordinary Chinese eat the cheaper domestic product, those that can afford the extra expense prefer the imported article. The demand for foreign canned foods, while still small in comparison with the number of people in China, has grown to an appreciable extent, and is bound to increase as more of the Chinese masses can afford to buy them. In addition to the demand from natives, the majority of the foreign population in China (numbering over 350,000) buy only imported canned foods and would not buy at any price canned foods made by Chinese.

China presents an excellent outlet for condensed, evaporated, and dried milks, as there is not a sufficient supply of fresh milk in China to meet the demand. There are many Chinese dairies, but much of the milk supplied by them is unsafe to drink. The amount supplied by the few foreign dairies in cities like Shanghai, Hongkong, and one or two others is totally inadequate.

The Chinese prefer condensed milk which flows like fresh milk as compared with Western preference for condensed milk thick as cream. As the summer in China is extremely hot and lasts from June till the end of September, canned milk intended for this market should be able to withstand a marketing period of nine months after arrival in China. Although some returns are inevitable, these can always be sold to local confectioners and bakers at satisfactory prices. The competition in condensed and other canned milks is not yet so keen as it is in other food products, as the business is still handled by only a few large firms. The greatest demand is for full-cream sweetened condensed milk, packed 48 tins to a case. There also is a growing demand for evaporated, malted, and powered milks, as well as for infants' foods, and when offering such lines to the Chinese market, they should be handled at the same time. Imports of such canned foods into China in recent years are shown in the table on page 212.

Chinese do not eat butter to any great extent as yet, and the demand is mostly from foreign residents at the treaty ports. The better quality butter is preferred, as the average Westerner in China considers quality first, price being a secondary consideration. Imports of butter into China during recent years were:

	Butter		
	1926	1927	1928
U. S. A.	$41,724	48,990	25,560
Canada	162,032	153,590	152,792
Australasia	169,936	87,285	125,031
Hongkong	228,228	271,998	333,416
Total, including all others	677,844	581,670	741,595

There also is a limited demand for cheese in China, this commodity being consumed by foreign residents there and not by the Chinese. Imports of cheese into this market average $135,000 in value annually, America, Canada, and Europe being the principal sources of supply.

Sugar cane has been known and cultivated in China for centuries. It is eaten in its raw state by the Chinese, just as candy is here. Juice is simply boiled down to a thick mass for use in confectionery or for cooking purposes. Chinese children are just as fond of sweets as are children in other countries, and a great deal of "native confectionery" is now manufactured in China. The cheapest kind of unrefined sugar is boiled down into a sirup and mixed with flour and other ingredients. This class of confectionery is very cheap and sweet.

Ewing Galloway, N. Y.

Carrying flour aboard a river steamer at Harbin, Manchuria, for shipment inland

Ewing Galloway, N. Y.

The mouths of young China may not always be content with mere sustenance

With the coming of foreigners and their growing influence among the Chinese masses, imported confectionery has become increasingly popular, not only among foreigners in China but also with all classes of Chinese. There is a large demand in China for chocolate bars (plain, milk, and almond), assorted bonbons, chocolate candy, soft and hard fillings, chocolate peppermints, toffee, and caramels. There are several fairly large Chinese manufacturers of candy in China as well as numerous smaller ones. Their products do not, however, offer severe competition to the imported confectionery, being much inferior in quality and presentation.

Considerable quantities of covering chocolate, both sweetened and unsweetened, is purchased. The usual packing of such chocolate suitable for the Chinese market is 100 pounds (10 10-pound blocks) to a case. Candy suitable for presents on special occasions (Chinese festival days, Easter, New Years, and the like) finds a ready sale at all the treaty ports and very satisfactory prices are obtainable, especially for confectionery packed in fancy boxes. The statistics of China's purchases of such foodstuffs given below will enable those interested in this market to obtain an idea of its present volume.

Practically every kind of fruit is grown in one part or other of China, but lack of communication and transportation facilities makes adequate distribution expensive if not impossible. In many cases the domestic products cannot compete with fresh or dried fruit imported from the United States and other countries. The greatest demand for such fresh and dried fruits comes from Shanghai, Tientsin, Dairen, Kowloon, Harbin, Canton, and Antung, and it is there that the major part of the business is done and the best prices are obtainable. The following are some of the principal fruits imported into China, and for which there are important possibilities for American products:

FRUITS

(Fresh, dried, or preserved, not otherwise recorded)

	1926	1927	1928
U. S. A.	$96,520	75,830	80,230
Japan	379,544	331,890	308,140
Hongkong	181,716	514,326	652,561
Total, including all others	886,920	1,093,236	1,341,403

Foods Imported by China

	Condensed Milk			Evaporated Milk			Infants' Foods		
	1926	1927	1928	1926	1927	1928	1926	1927	1928
U. S. A.	$646,000	368,460	504,100	304,988	282,210	352,160	81,092	110,400	149,313
Netherlands	56,924	36,570	84,700	.....	.....	.....	.....	.....	.....
Australasia	.....	.....	.....	.....	.....	.....	194,028	232,116	266,250
Hongkong	193,800	527,160	705,740	18,176	25,800	31,950	17,480	32,016	48,919
Total, including all others	993,640	1,054,044	1,476,516	380,760	359,490	435,940	409,336	505,770	615,570

	Cocoa and Confectionery			Chocolate			Crackers (Plain and Fancy)		
	1926	1927	1928	1926	1927	1928	1926	1927	1928
U. S. A.	$115,140	112,740	196,883	23,256	13,110	16,827	89,072	75,279	84,277
Great Britain	151,316	99,567	165,785	12,540	6,486	12,851	188,784	145,590	171,820
Hongkong	17,936	32,568	48,493	4,309	15,456	6,737	26,600	51,888	61,000
Japan	296,096	294,699	270,581	2,538	4,181	2,769	16,948	10,764	10,153
Total including others	726,636	677,580	941,247	181,716	210,317	180,553	371,640	312,570	371,614

	Fresh Apples			Fresh Lemons			Fresh Oranges		
	1926	1927	1928	1926	1927	1928	1926	1927	1928
U. S. A.	$155,800	61,755	57,084	95,760	85,560	90,028	282,037	276,483	.....
Korea	281,580	228,390	239,980	.....	.....	.....	.....	.....	.....
Japan	56,544	48,093	88,750	.....	.....	.....	1,003,960	784,875	.....
Canada	29,032	37,950	50,623	.....	.....	.....	.....	.....	.....
Total, including all others	546,212	368,953	470,002	98,268	88,320	93,081	1,419,960	1,364,613	1,285,242

	Canned Fruits (Table and Pie)			Currants and Raisins					
	1926	1927	1928	1926	1927	1928			
U. S. A.	$156,028	183,540	219,603	346,104	306,015	328,298	.....	.....	.....
Total, including all others	264,480	298,425	384,252	423,320	448,980	475,487	.....	.....	.....

CANNED FOODS

(Not otherwise recorded)

	1926	1927	1928
U. S. A.	$364,192	245,192	317,015
Japan	249,356	255,300	314,814
Total, including all others	893,380	790,533	994,000

COFFEE

	1926	1927	1928
U. S. A.	$35,112	52,992	45,582
Dutch Indies	25,080	25,185	30,601
Straits Settlements	21,508	28,566	26,412
Total, including others	141,588	186,300	168,483

China has about 24 million head of cattle, used principally for agriculture and transport. As soon as they have passed the age of usefulness, they are killed for their hide, this, and not their meat, being of chief value in China. Beef is becoming more popular as a meat among the Chinese, but it is not nearly as widely consumed and relished as is pork. With the growing consumption of meat among the Chinese, canned meat products are being manufactured by Chinese canneries on a small scale. The quality, however, is inferior to foreign meat products. There is a considerable demand from both the foreign population and the better-class Chinese for imported meat products. Every variety of canned and smoked meat is salable in China, provided it is of good quality. Bacon and hams (in bulk) form approximately one-half of the prepared and preserved meats imported, total imports of which were as follows:

MEATS PREPARED OR PRESERVED (in bulk)

	1926	1927	1928
U. S. A.	$20,876	39,047	31,311
Canada	1,444	43,677	32,660
Great Britain	65,208	56,580	42,742
Total, including all others	257,260	361,422	314,104

ANIMAL PRODUCTS AND GROCERIES

(Not otherwise accounted for)

	1926	1927	1928
U. S. A.	$96,748	38,778	48,393
Japan	86,336	45,816	40,328
Great Britain	40,908	37,329	45,085
Australasia	155,952	139,794	93,862
Total, including all others	536,428	400,890	442,614

The most effective way for the smaller manufacturer to enter the Chinese market is to appoint an agent on the spot in all the more important trading centers, such as Shanghai, Tientsin, Hankow, Hongkong (an important port of transshipment), Canton, Dairen, and Harbin. The foreign importer of foodstuffs in China sells both to Chinese wholesale dealers and to "Compradore" stores (grocers), who sell to the public. Many of the larger "Compradore" stores obtain some of their supplies direct from the exporter or manufacturer abroad. The matter of dealing direct with Chinese importers, wholesalers, and the larger grocery stores should receive serious consideration, as more and more of such direct trading is now being done. In the latter case, payment should be insisted on by means of the customary letter of credit opened in the shipper's favor, enabling him to obtain payment before goods leave port of shipment.

Larger firms and manufacturers will find that China is a market important enough to warrant the opening of a branch in China, preferably in Shanghai, which is the most important trading center in the Far East, and has the largest Chinese (2,500,000) and foreign (40,000) population. To do this, a Chinese selling organization would have to be organized, but this is not difficult. A "Compradore" (a sort of go-between) would be employed, and it is for him to introduce customers and business as well as to guarantee dealers' accounts up to a certain percentage (generally 25 per cent). In return, he receives a commission on all transactions (varying from $2\frac{1}{2}$ to 10 per cent, according to the commodity handled and the percentage of dealers' accounts guaranteed by him), as well as a salary to cover wages paid by him to his Chinese staff. The latter comprise several "Shroffs" (salesmen and collectors) and the usual clerical staff. He engages them and is responsible for their actions and work.

One of the largest firms operating in China in canned milk and milk foods dispenses with the services of a "Compradore," but deals direct with Chinese wholesalers and retailers. In the grocery trade, credit has to be given in China, but given a good selling organization, backed up by effective advertising, which plays an important part in the sale of all foodstuffs in China, little fear need be entertained of incurring bad debts. On the whole, the standard of commercial morality of Chinese dealers is fairly high, and business with them is not difficult.

In conclusion, those interested in this market should not be deterred from extending or expanding their activities in China just because of the frequent news that reaches this country of the "wars" and other disturbances constantly taking place in one part or another of China. Chinese "wars" have, on the whole, little effect on trade; they certainly do not preclude it from continuing its usual course.

The Chinese are steadily becoming more Westernized and the purchasing power of the average Chinese is gradually growing. Both these factors augur well for the demand for foreign foodstuffs in China, and it is for exporters and manufacturers here to push their products in this market, one of the best in the world that still remain to be fully exploited.

How can canned apples of these three types be accurately graded?

Grading Foods by a DESCRIPTIVE METHOD

By L. CHARLES MAZZOLA
Formerly Research Department, New York Canners, Inc.,[1] Rochester, N. Y.

THE PRESENT METHOD of grading canned foods is often regarded as unsatisfactory for modern requirements. With the numerous products of many shades of quality which the canning industry produces it is increasingly necessary to have adequate methods to classify or "grade" them. The old method of designating the various foods as either "fancy," "extra standard," or "standard," is largely an individual interpretation with a considerable measure of the personal ingredient in each determination, leading to justifiable differences of opinion and dissatisfaction.

As a result of the general realization of this inadequacy, numerous attempts have been made to substitute other methods that are more scientific. The outstanding efforts in these substitutions are those of the Wisconsin Pea Packers' Association and those of various government bureaus. All of these attempts have reduced the principal quality factors of the various canned foods to their simplest terms, each of which is given a relative weighting, but this requires the assumption of the difficult task of giving an adequate weight to each factor in contrast to every other factor that goes to make up quality. Such efforts are considered, by many, to be a great improvement over the older methods, inasmuch as they represent an attempt at more systematic, more scientific classification of these factors. To some degree, they have eliminated the human equation so much involved in the older subjective method, but, even in these attempts, there seems to be room for improvement, as evidenced by the opposition registered in many quarters to the general adoption of these methods.

The principal objection to these suggested methods is largely attributable, it seems, to the fact that they contrast quantitatively the value of one quality with that of another, and since each individual may possess a different appreciation of the relative importance of each of these qualities, in a given food, it is not surprising to observe the decided differences of opinion that exist with regard to these suggested methods of grading. If this diagnosis is correct, then it would seem that a method could be evolved that would merely describe quantitatively the various quality factors of canned foods without contrasting them. Such a method would eliminate, to a greater extent than heretofore, the individual's interpretation of the relative value of the various factors that describe quality. This assumption is based upon the principle that to decide upon a grade composed of a number of variables, each of which has a disputable value—and to contrast these one to another, somehow attaining a harmonious relative weighting—is not nearly as simple as deciding upon one point at a time without regard to its importance in relation to the others.

To illustrate, the existing methods attempt to say that if we assign a value of 10 points to the quality factor of color in a can of apples, the factor of flavor must have a value of perhaps 35, and consequently that the factor of texture should have a relative value of 25. Any attempt to assign an equitable value or weight arbitrarily to each of these qualities would be challenged by many people, regardless of the value set for each of these, for the reason previously mentioned—that not many people agree on the relative value of each of the quality factors. This problem is further complicated when a greater number of factors are taken into consideration,

[1]Now general manager, Geneseo Jam Kitchen, Inc., Geneseo, N. Y.

each of which must be necessarily contrasted with the others.

With the method here suggested, on the other hand, each factor is observed and described, by a simple quantitative method—without contrasting it with any other quality factor. Thus, the proposed method has for its objective the detailed quantitative description of all the various quality factors, and the elimination of the individual's subjective interpretation of them.

A type specimen of the proposed method follows, in which we start with the data necessary for identification purposes, as well as general facts regarding the particular sample involved. It is then followed by a tabulation of the various quality factors of that food reduced to this simplest form. Each of them is described by the highest single digit, 9. The entire range of a given factor is quantitatively described by figures lying between 3 and 9. The gradations are indicated by appropriate words describing the intermediate stages, and these are quantitatively designated by the digit most closely indicating the condition.

By referring to the specimen sheet headed "Apple Score Sheet" it will be noticed that at the top are four items chosen to give descriptive information concerning the particular block of canned apples, and that at the bottom of that sheet are similarly five subdivisions selected for the same object. The main body of the score sheet is arranged to describe ten major quality factors that constitute a fairly complete picture of the product. Furthermore, perfection in each of these major quality factors is represented by the figure 9—a figure chosen because it is the highest single digit and permits the widest range for descriptive purposes with a single figure.

This method is not an attempt to contrast one quality with the other; it does not attempt to say that the factor of color is equal to, greater or of less importance than the factor of tartness, and the like. It will be further noticed that each of the major quality factors is subdivided into three stages. Although an effort has been made to describe in more detailed words the entire range that any particular quality factor could assume, this now appears to be one of the major phases of the future development of these score sheets that will require time and co-operative effort to develop to the maximum usefulness. Each of the subdivisions is next represented by one or more letters, followed by serial numerical gradations to describe each of the subdivisions. It is necessary to make this numerical gradation continuous, because the quality range of each factor is continuous. Thus, the description can be very close.

An illustration of an actual sample score sheet is shown in the figure at the right.

The foregoing description is perhaps self-evident, but for the purpose of clarity it will be interpreted. Translated it reads as follows: Cans from this block of 3,500 cases of No. 10 canned apples were filled to the top, with fruit of excellent natural color; the cans were fairly bright on the inside; the apples, in very clean-cut pieces, were free from blemishes, skins, seed cells, and the like; they were very aromatic, with full tartness and tender texture, but badly mixed as to large and small pieces.

Anyone reading this description, together with other descriptive data concerning the particular block on hand should have no difficulty in visualizing the contents of the can in question.

Application of the principle here involved will substitute descriptive information for personal opinions. Active discussion and criticism is not only expected but is earnestly invited. Score sheets for some of the other canned-food items have been developed awaiting further perfection through application. There may be some value in having the result expressed on a percentage scale, provided it is always read together with the descriptive data herein referred to. A mathematical formula to accomplish this result has been developed and will be given out at a later date.

TABULATION SHEET upon which quality factors of canned apples are entered

APPLE SCORE SHEET

Date 3/25/20

				A	B	C	D	E	F	G	H	I	J
Sample (See Below)													
Indicate kind Cut 1/16-1/12-1/8-1/4,etc.				1/16									
Drain weight in lbs. and oz. (2 Min.drain)				6.6									
Volume liquor (liquid oz.)				0									
Fill---------9	a. Full	Fl.	8-9	9									
	b. Skimpy	Py.	6-7										
	c. Slack	Sl.	3-5										
Color--------9	a. Natural (White	Nt. Wt.)	8-9	9									
	b. (Pinkish (Mixed	Pk.) Mx.)	6-7										
	(Dead White (Pink	D.W.) Pk.)											
	c. (Very Dark (Mixed (Off	V.D.) Mx.) Ff.)	3-5										
Can (Inside)-9	a. Bright	Bt.	8-9	8									
	b. Dark	Dk.	6-7										
	c. Black	Bk.	3-5										
Cut----------9	a. Clean	Cl.	8-9	9									
	b. Rough	Rf.	6-7										
	c. Broken	Bn.	3-5										
Blemishes----9	a. Free	Fr.	8-9	9									
	b. Present	Pr.	6-7										
	c. Prominent	Pm.	3-5										
Impurities, Skins, etc.- 9	a. Free	Fr.	8-9	9									
	b. Present	Pr.	6-7										
	c. Prominent	Pm.	3-5										
Apple Flavor-------9	a. Aromatic	Ar.	8-9	9									
	b.(Slightly Salty (Perceptible	S.S.) Pp.)	6-7										
	c. (Blank (Salty (Foreign	Bl.) St.) Fg.)	3-5										
Tartness-----9	a. Tart	Tt.	8-9	9									
	b. Perceptible	Pp.	6-7										
	c. Blank	Bl.	3-5										
Texture------9	a. Tender	Td.	8-9	9									
	b. (Firm (Soft	Fm.) Sf.)	6-7										
	c. (Hard (Mushy	Hd.) Ms.)	3-5										
Uniformity of Size------9	(Uniform Large (Uniform Medium (Uniform Small	Lg.) Md.) Sm.)	8-9										
	b. (Mixed Noticeably (Mixed Prominently	M.N. M.P.)	6-7										
	c. (Mixed Badly (Very Small	M.B.) V.S.)	3-5	5									

Sample & Size Tin	Brand	Packer's Name	Seller's Grading and year Packed	Variety	No. Cases and Remarks
A 10.	X	Y	Fancy Sched Pack 1928	N.Y. State Baldwin	3500 Cs.
B					
I					
J					

Scored by [illegible]

Grove City Creamery

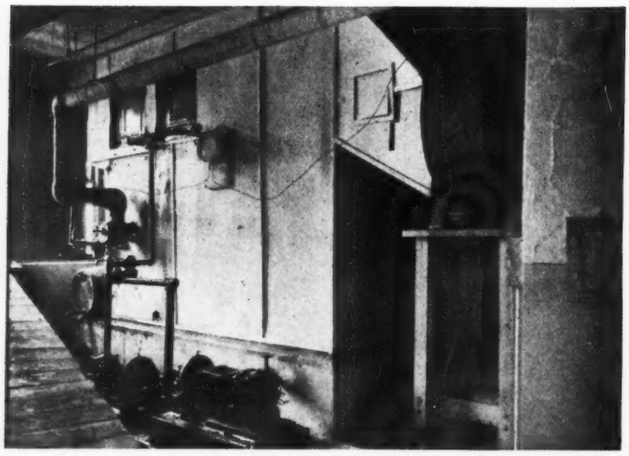
SCIENCE *and* AIR-CONDITIONING *Make*

DOMESTIC ROQUEFORT PRODUCTION

A Commercial Possibility

ROQUEFORT CHEESE is manufactured in the United States. This is a contradiction to a statement on cheese that recently appeared in a leading women's publication. The error merely emphasizes the fact that even the venerable dairy industry is rapidly undergoing changes, for now Grove City, in western Pennsylvania, and Roquefort, a village in southern France, have a point of common interest. Both have an enviable reputation for the manufacture of a type of cheese called Roquefort.

CONTROL OF HUMIDITY in curing room is maintained by this equipment



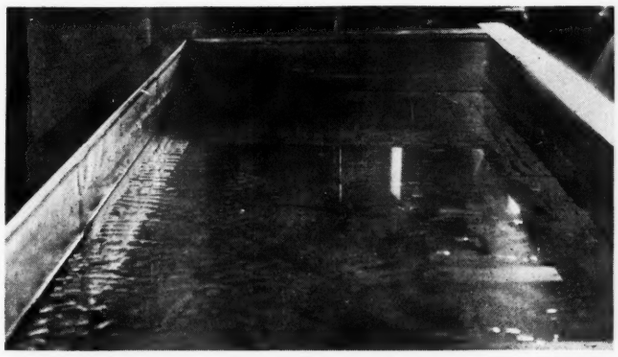
By R. F. FLINT
Manager, The Grove City Creamery, Grove City, Pa.

In France, where the cheese originated and is made chiefly from sheep's milk, there are natural caves in which the Roquefort is cured, so located that air descends through crevices above, gathering moisture on its downward course. The cool, moisture-laden air influences the development of an edible mold, *Penicillium roqueforti,* in the curd, which assists in giving the cheese the spicy, appetizing flavor characteristic of Roquefort.

At Grove City, located in the foothills of the Allegheny Mountains, there are no natural caves, but conditions have been developed which produce the desired results, possibly better, because moisture and temperature are under mechanical control. It is another instance of American ingenuity improving on old-world methods and products. The details of arrangements, as well as the technique of manufacture, were worked out by the Bureau of Dairy Industry, U. S. Department of Agriculture. The Roquefort is made from full-cream cows' milk, produced and manufactured under sanitary conditions. Connoisseurs have stated that no better flavored Roquefort is made in France than is made at Grove City.

From five to six months is required to produce a Roquefort cheese, and close attention throughout is necessary to insure the desired results. The procedure is as follows: The bacteriologist first propagates a pure

mold culture. Fresh loaves of rye bread with a protective crust are inoculated with the mold. This is accomplished by suspending the mold spores in sterile water and, with a sterilized pipette, piercing the loaves in several places and permitting some of the spore-laden water to run into the loaf at each insertion. The loaves are then placed in a cool, moist room for the mold to develop —a step that requires from four to six weeks. The interiors of the loaves are then removed, dried and pulverized, and placed in perforated-top shakers. It is



VAT with cut curd

desirable that the mold be developed in the loaves at a temperature not to exceed 50° F., as low temperatures check the development of undesirable molds.

Sweet, raw milk, containing from 4.0 to 4.2 per cent butter fat, from tuberculin tested cows, is placed in an ordinary cheddar cheese vat. Four per cent of lactic starter is added and the milk brought to an acidity of 0.20 to 0.22 before setting. The milk is raised to a temperature of 83 to 85° F. and set with a commercial rennet, at the rate of 8 c.c. per 100 pounds of milk. The milk is allowed to set from one to one and one-half hours, and the curd is then cut two ways with a 1-inch curd knife. An adjoining vat with a capacity similar to the setting vat is equipped with wooden draining racks, over which is spread a strong cheese cloth. The curd is dipped from the setting vat with large tin scoops and spread over the draining cloth. The draining requires from 20 to 30 minutes.

The cheese hoops are of galvanized metal, cylindrical in form, $7\frac{3}{8}$ inches in diameter and 6 inches in depth, and have 150 $\frac{1}{16}$-inch holes through the sides. These hoops are placed on reed mats lying on boards that hold three hoops. The mats and boards are sterilized with steam before coming in contact with a fresh lot of curd.

The curd, a white mass, is placed in the forms, heaped up but not pressed. The mold is lightly sprinkled between layers of curd while it is being placed in the forms, at the rate of about 0.2 gram per cheese. The boards bearing the mats and cheese are then transferred to the draining room. This room has a temperature of from 65 to 68° F., and a relative humidity of from 80 to 90. Fifteen to 20 minutes after the forms have been filled the cheeses are inverted. This turning is repeated twice the first day, and twice each day thereafter until the cheeses are salted. The object of the repeated turning is to hasten the draining, and to insure an even surface.

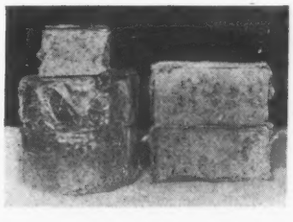
On the morning of the second day the forms are removed, and the cheeses washed in cold, salty water. During the afternoon they are transferred to freshly sterilized, dry boards. On the third they are handled as on the second. On the fourth day they are scraped and then washed. At this time they are also transferred to another cooler, and salted while still damp. On the fifth day they are turned, and salted again on the sixth. The salting is done at a temperature of approximately 48° F. Fine, dry salt is rubbed vigorously over the entire surface, and all that will adhere is used. A good Roquefort contains about 4 per cent salt. The cheeses still remain on the boards, when not handled individually, in order that they may dry and for convenience in handling.

The cheeses average approximately 8 pounds on the first day, and contain 51 per cent moisture. By the fourth day the moisture content has been reduced to 45 per cent.

After the salting period, which is about ten days, the cheeses are scraped a second time. An ordinary table knife is used for this purpose. At this time the relative humidity in the curing room is increased to 83-89, at a temperature of from 45 to 50°. This atmospheric condition is maintained until the cheeses are about two months old. This high humidity is maintained through the use of a motor-driven circulating pump, which sprays water in a chamber connected to the cheese curing room. A motor-driven fan blows air through the falling water into the cheese room, where it is blended with steam from slightly cracked valves located at the air intakes. The refrigeration is of the direct-expansion type.

ROQUEFORT CHEESE in the early ripening stage after salting

FULLY RIPE domestic Roquefort cheese made from cows' milk



After salting, and concurrent with the advance in humidity, the cheeses are perforated to admit the air necessary for the development of the mold, and are set on edge instead of on the flat surface. They are retained in this position until ready for the third scraping.

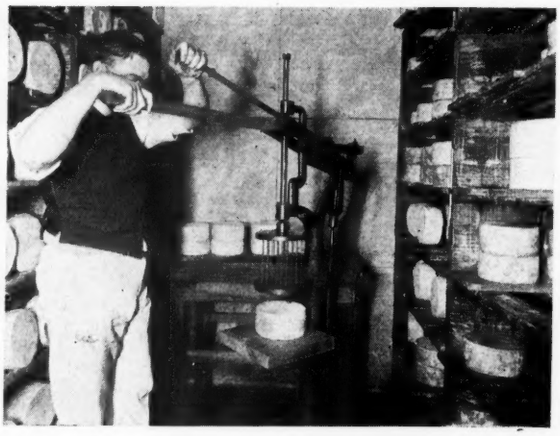
At the expiration of approximately two months of the relatively high humidity, the cheeses are scraped a third time. Following this, they are tinfoiled and then wrapped in butcher paper, and ripened from three to four months longer. Throughout this period the temperature and humidity conditions remain the same, except that the steam admixture is eliminated. The ripening period may be speeded up, but, when tried, this has resulted in reduced quality. The ripened cheeses are held at a tem-

FRESHLY MADE uncured Roquefort cheeses on the draining shelves

PERFORATED CHEESE standing on edge after second salting

perature slightly above freezing, and under this condition they retain their fine quality for months.

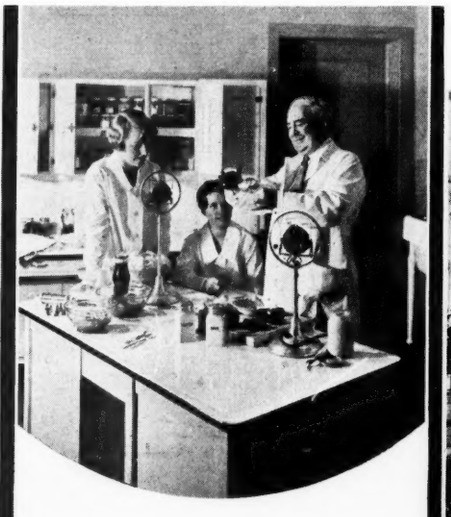
The losses in the manufacture of cows' milk Roquefort are 0.2 to 0.3 per cent fat in the whey, and approximately 7.5 per cent of weight in scraping. The yield, using 4 per cent fat milk, is 10 to 11 pounds per hundred of milk, based on the marketing weight of the cheese. No means has yet been devised whereby ripened Roquefort of uniform weight can be assured.

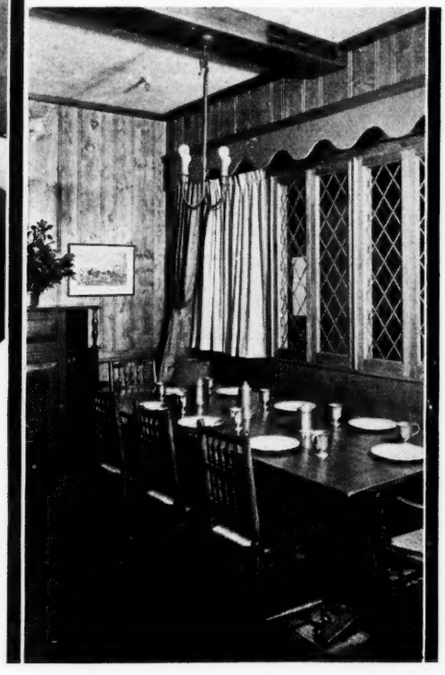


PERFORATING THE CHEESES to admit air and assist mold development

The description may give the impression that several curing rooms are used, when, as a matter of fact, but three are used. This number meets the requirements by change of temperature and humidity, and because Roquefort is made at Grove City only during the spring, before cows are on grass. Special effort is made to produce a mild-flavored Roquefort, for the majority of the American public is not fond of high-flavored cheese. This is a matter of development, and if Roquefort is to become an important item of diet, greater headway will be made through mild than through sharp-flavored cheese. Cheese of sharp flavor may be developed through more extended curing.

Grove City is the only place in the United States, so far as information is available, where Roquefort cheese is manufactured on a commercial scale from cows' milk, and even here the output does not exceed 4 tons per season. However, interest in the manufacture of a domestic Roquefort cheese, as well as the excellence of the product, has resulted in its distribution by direct shipment over an interestingly wide area.





Putting Over An Idea In a New Way

VISITORS at the Chicago plant of Libby, McNeill & Libby carry away, as final impressions, the scenes here illustrated. The domestic-science kitchen—also a broadcasting studio on Wednesday mornings—has a plate-glass window on the side toward the visitors' route. It happened that George Rector himself was broadcasting when this picture was taken. The next view and final memory of Libby's plant is the beautiful early American dining room shown here. It centers attention on the fact that all of the effort and skill employed in the factory is to prepare food not for one's kitchen but for the dining room.

Does Sugar Inversion Affect PECTIN JELLY *Formation?*

By G. M. COLE*, R. E. COX† and G. H. JOSEPH†

A GENERALLY unrecognized phenomenon, one that may account for the failure of many commercial jams and jellies, as well as for many erroneous conclusions in experimental work, has long been obscured in the confusion that exists concerning the effect of sugar inversion on the formation of pectin jellies.

That cane sugar is inverted during the making of pure fruit jellies was pointed out as early as 1901 by Tolman, Munson, and Bigelow[1]. They came to the conclusion that the extent of inversion varied with the time of heating and the nature and kind of acid present. Goldthwaite[2] agreed with these findings. It was generally felt that a certain degree of inversion was desirable, to inhibit the crystallization of sucrose in the finished jellies. Tarr and Baker[3] asserted that moderate inversion was a necessity for the production of the best results.

On the other hand, more complete inversion has been regarded as inherently unsatisfactory. Recently, Fiedler[4] stated that satisfactory pectin jellies cannot be made with glucose or invert sugar. He interpreted his data to show that the inversion of sucrose causes the pectin to lose more or less of its jellifying power, the amount of loss depending upon the extent of the inversion, and came to the conclusion that pectin will not form jellies with invert sugar.

Fiedler based his conclusion on the results of experiments in which he boiled for 10-minute periods a jelly batch containing pectin, sugar, and water, both with and without the requisite quantity of setting acid. He noticed a pronounced loss in jellying power when the acid was present during the cooking operation, especially at higher sugar concentrations. The cause of this loss, he felt, was the inversion of sucrose by the setting acid during the cook. The increase in the loss of jellifying power at higher sugar concentrations he explained as due to the higher rate of sucrose inversion, an increase well in keeping with theory, considering the elevation of the boiling point.

Although not expressly stated by Fiedler, his conclusions lead directly to the idea that the increased rate of inversion, together with greater initial quantities of sugar, result in a greater ratio of invert sugar to pectin; and that this, in turn, produces poorer jellies.

Fiedler's interpretation of his experimental data would imply that sucrose is essential to a satisfactory pectin jelly. That such is not the case is attested by the fact that some American manufacturers make high quality jellies from sucrose that has been purposely inverted. If proper precautions are taken, excellent jellies can be prepared from commercial glucose (corn sirup), or from dry corn sugar (cerelose). As an example, a small batch might be made to contain:

	Grams
Corn Sirup	795.0
Water	254.5
"100" grade dry pectin‡	10.5
Total	1,060.0

(For "160" grade pectin, use: water, 258.4 grams; pectin, 6.6 grams)

‡Pectin is classified according to its ability as a jellying agent. "Grade" of pectin is the weight ratio of cane or beet sugar to pectin in a jelly of commercial firmness containing 65 per cent sugar. In other words, 1 pound of 160 grade pectin will form a good jelly with 160 pounds of sugar in a batch weighing 246 pounds.

The corn sirup, heated by steam until it is quite fluid, is poured into the pectin dispersion. After stirring, the batch is poured into containers in which the proper quantity of setting acid has already been placed. These glucose jellies, containing fruit flavors and colors, are usually made in batches of 100 to 200 pounds.

Any assumption that inversion of sucrose appreciably affects the ability of a pectin to form a jelly might be construed as indicating that a chemical change involving sucrose and pectin was implicated in the formation of pectin jellies. This is not the case. The authors have prepared jellies of good quality containing from 65 to 84 per cent of anhydrous glycerol and no sugar whatever. Jellies using other dehydrating agents, such as ethyl alcohol, glacial acetic acid, and calcium chloride solution, have also been prepared. Spencer[5] has recently described the preparation of sugarless jellies from potassium ferricyanide, as well as from glycerol and alcohol.

Inversion of Sucrose in Jellies During Storage

A pectin jelly is assumed to have a framework of pectin micella, the voids in the framework being partly or wholly filled with the liquid phase. If such is the case, it should be possible for sugar inversion to proceed after the jelly has formed, even at room temperature. The truth of this assumption is demonstrated in Table I.

Table I—Rate of Sucrose Inversion in Pectin Jellies

Kind of pectin	"160" grade citrus pectin				
pH of jelly	2.09	....	....	....	.....
Days of storage at 28° C.	1	31	60	91	113
Per cent sucrose inverted during storage	28.8	71.5	91.3	97.5	99.0

Average velocity constant of inversion (calculated from data), 0.2820 x 10-4

The water jelly mentioned in Table I was made by the standard laboratory method described by Wilson.[6] The extent of sucrose inversion in the individual 2-ounce samples of jelly was measured by Benedict reagent standardized upon U. S. Bureau of Standards sucrose which had been inverted by A.O.A.C.[7] methods.

The significant thing about the determinations listed in Table I is the fact that, after 99 per cent of the sucrose had been inverted, the jellies still retained their

*Exchange Lemon Products Company, Corona, Calif.
†Research Department, California Fruit Growers' Exchange, Ontario, Calif.

original firmness, clarity, and texture. Samples of these jellies were turned out of their glasses after a storage of 113 days at 28° C. and allowed to stand on open plates for several days. The degree of syneresis, or "weeping," observed was the same as that of jellies in which only a small portion of sucrose was inverted.

These data are convincing evidence that inversion proceeds in a uniform mathematical manner and at a rate giving a velocity constant that falls within the range usually covered by the sucrose inversion constants in comparable systems. Furthermore, they add to the evidence that pectin jellies resemble other gels in that certain reactions can proceed in them as well as in the corresponding liquids.

Preparing Invert-Sugar Jellies

The data in Table I indicate that practically complete inversion of sucrose in a jelly after its formation does not alter appreciably the properties of the jelly. The question then arises as to the effect upon the properties of a jelly if the sucrose be practically all inverted before the gelation of the batch. For this experiment, "160" grade citrus pectin similar to that employed by Fiedler was used, and enzymic inversion was resorted to, for reasons which will later be made obvious. The jelly formula used was as follows:

Citrus pectin, "160" grade	2.7 grams
Sucrose	432.0 grams
Water	229.3 grams
Tartaric acid (373.6 grams per liter solution)*	6.0 milliliters

One batch of jelly was prepared by mixing the dissolved sugar with the pectin sol, adjusting to weight at the boiling temperature, and pouring into three glasses, each containing 2 milliliters of the standard* acid solution. A second batch of jelly was prepared in a similar manner except that the sucrose solution was treated with invertase until measurements with the polarimeter indicated 96 per cent inversion.

The methods of preparation for these jellies were identical except that in the second case approximately 96 per cent of the sucrose had been inverted before preparation of the jelly. Although the gelation of the invert sugar batch required 25 minutes, as compared to 6 minutes in the case of the sucrose jelly, when allowed to cool after pouring into the glasses, no appreciable difference in the firmness or in the weeping of the jellies could be discerned when examined 3 hours after gelation and again 24 hours later.

That the sucrose inversion which takes place during the ordinary jelly cook cannot account for the jelly failures such as Fiedler describes is evident from the test. In commercial practice, seldom if ever does inversion proceed to the extent of 96 per cent. If inversion was not the cause of jelly failures, a further explanation had to be sought. It was to this end that enzymic rather than acid inversion was used with the second batch. In neither case was the pectin and sugar mixture boiled or held in the presence of the acid employed for any appreciable length of time before gelation.

Common Errors in Jelly-Making Practice

Jelly failures often result from "premature gelation." This may be of two kinds, in one case due to the drop in temperature caused by adding the sugar in one portion to the acidified pectin solution, thus momentarily forming a gel around some of the sugar particles and lessening the available jellifying power of the pectin; the other resulting from holding the complete batch too long at a pH suitable for gelation before pouring. This latter type of pre-gelation is the most disastrous, and undoubtedly the major factor causing the failures reported by Fiedler. In other words, Fiedler's jelly failures were due to the presence of the acid during the cook, and the inversion of sucrose was incidental. Inversion, then, is not a factor in determining whether or not a good jelly will result.

Various types of pectin have the ability to form jellies in the proper mixture of sugar-acid-pectin in certain definite times. This time-of-set may be only a fraction of a minute or may be several hours. If a jelly that would normally set in 5 minutes were boiled or otherwise agitated for 10 minutes with sufficient acid present, it is not difficult to understand why a failure would result, for when the gel formation is hindered at the beginning by ebullition, stirring, or pouring, the framework necessary for a good jelly cannot form.

Aside from the natural inherent setting rate of a given pectin and within the range of acidities satisfactory for commercial jellies, such factors as the nature of the acid, the pH of the batch, the temperature during cooling period, and the nature and concentration of sugar, all affect the setting rate of the jelly. Of these factors, sugar concentration is most important. Since premature gelation depends upon the setting rate, and since the latter is greatly speeded up by a slight increase in sugar concentration, it is to be expected that weakening or failure of jellies due to the premature-gelation phenomenon should become more apparent at higher sugar concentrations. This is precisely what Fiedler observed in varying his sugar concentrations from 50 to 70 per cent in the jelly, and explained on the basis of increased inversion at higher sugar concentrations.

How to Avoid Premature Gelation

Premature gelation may be avoided in two ways: by heating only to the boiling point and pouring quickly, so as to shorten the time of contact between the acid, pectin, and sugar in the jelly kettle; or, the better way, by eliminating the acid from the cooking batch, placing the acid in the containers, and pouring the jelly batch upon it.

Quite commonly the quantity of pectin used is insufficient for the formation of firm jellies. For instance, from the paper by Fiedler it is evident that the pectin, stated as being of 160 grade, was used as if it were 250 grade.†

To determine the relative effects of premature gelation and of sucrose inversion on the texture and firmness of standard sucrose pectin jellies, three batches of jelly were prepared. Citrus pectin of 160 grade, the same sample used in the preparation of sucrose and of invert sugar jellies previously described, and chosen as comparable to the material used by Fiedler, was employed. Each batch consisted of 2.7 grams of pectin, 432 grams of sucrose and 232 grams of water, so that the pectin was used at its proper grade of 160, and with a 65 per cent sugar concentration, the value used in standardizing this type of pectin. In each case 6 milliliters of tartaric-acid solution (373.6 grams per liter of solution) was used for setting the batch, equivalent to 2 milliliters of

*Acid of this concentration is commonly used by preservers. It is usually made by dissolving ½ pound tartaric, or 1 pound crystalline citric acid, in one pint of water.

†This is calculated as follows: In Fiedler's jelly, containing 65 per cent sugar, there were used 26 grams of 1 per cent pectin solution or the ratio of sugar to pectin was 65/0.26, or 250. For "160" pectin there should have been 100 × 65/160, or 40.7, grams of solution used.

acid solution per 6-ounce jelly glass. The jellies were cooled at room temperature.

The sole difference in the three batches lay in the time at which acid and pectin were added. As shown by Table II, when the acid was added in the jelly glasses after cooking, and when sugar and acid were boiled previous to the addition of pectin, the results were good. Only when the three constituents were present during the boil was the result a failure.

Table II—Effects of Pre-gelation and of Inversion on Firmness and Texture of Pectin-Sucrose Jellies

Method of Cook	Time of Adding Acid	Condition of Jellies after 24 Hours Firmness	Texture
Jelly Batch 1			
Only pectin and sugar present during heating period	Acid solution placed in jelly glasses	Good commercial firmness	Resilient and smooth; no syneresis
Jelly Batch 2			
Sugar and acid present during 10-min. boil. Pectin sol added at end of boil. (Note: Sugar inversion should be comparable to that referred to by Fiedler, but here no pectin is present during inversion)	Acid present during the entire cook	Same as No. 1	Same as No. 1
Jelly Batch 3			
Pectin, sugar and acid boiled for 10 min.* (Entirely comparable to Fiedler's method, which produced poor jellies)	Acid present during the entire cook	Thin sirup only	Liquid; minute jelly grains apparent in the sirup

*That the jelly grade of the pectin is not appreciably changed by this heat treatment with the acid has been known for some time, and has been confirmed again by some of Fiedler's experiments.

The significant point illustrated by this test is the fact that jelly No. 2 has suffered in no respect as a result of the acid inversion which must have taken place during the boil, while only a grainy sirup resulted in batch No. 3, due to pre-gelation, which took place because of the 10-minute contact of all three components (pectin, sugar, and acid) before the batch was poured into the glasses. The normal setting time for jellies containing this pectin in 65 per cent sugar concentration is 6 minutes.

It is apparent that the acidity and sugar concentration during the boil of batches No. 2 and 3 were identical within the possible experimental error, and that the extent of inversion, therefore, must also have been comparable. It seems to be conclusively demonstrated that upon conditions governing pre-gelation, and not to any appreciable extent upon inversion of sucrose, rests the failure or success of the jelly.

The above experiment has been carried out repeatedly using various acidities, sugar concentrations, and pectins. Citrus and apple pectins, both liquid and dry, all behave similarly. The extent of pre-gelation has been found to depend: first, upon the natural setting rate of the pectin employed and, second, upon the sugar concentration and the pH value, inasmuch as both these factors affect the rate of gelation. Due to the absence of buffering materials in laboratory sugar and water jellies, pre-gelation is more likely to be encountered than when moderately acid and relatively highly buffered fruit juices are present.

Measures which may be employed to eliminate premature gelation in commercial practice include working at lowered sugar concentrations, use of a relatively slow-setting pectin, shortening of the period of cook, addition of fruit juices as late as possible during the cook and, as mentioned previously, the addition of the setting acid to the jelly container rather than during the cook, whenever practicable.

From the foregoing it seems clear that the usual troubles encountered in commercial preparation of glucose-sirup jellies, such as too rapid gelation and poor textured or weak jellies which tend to exhibit syneresis after gelation, are in all probability due to the inherent and quite variable acidity of ordinary grades of glucose sirup and not to the absence of sucrose.

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Record Sugar Supply Is Reported

ESTIMATING the 1929-30 world sugar crop at 29,833,000 short tons of raw sugar, as compared with last season's record crop of 30,281,000 short tons, the Bureau of Agricultural Economics, U. S. Department of Agriculture, says that "the world's visible supply of sugar is greater than in any previous year, and shows a continuation of the large supplies which have been increasing steadily since 1922-23, with the exception of a drop of about 1,000,000 short tons in 1926-27."

Decreased production from last season is reported chiefly in countries producing cane sugar, the world beet-sugar production of 10,250,000 short tons being practically equal to that of 1928-29. The world cane-sugar crop is estimated at 19,583,000 short tons, compared with 20,006,000 short tons reported for 1928-29 and 18,468,000 short tons in 1927-28. Slight decreases from the 1928-29 season occur in all important sugar exporting countries in Europe with the exception of Germany, Poland, and Hungary.

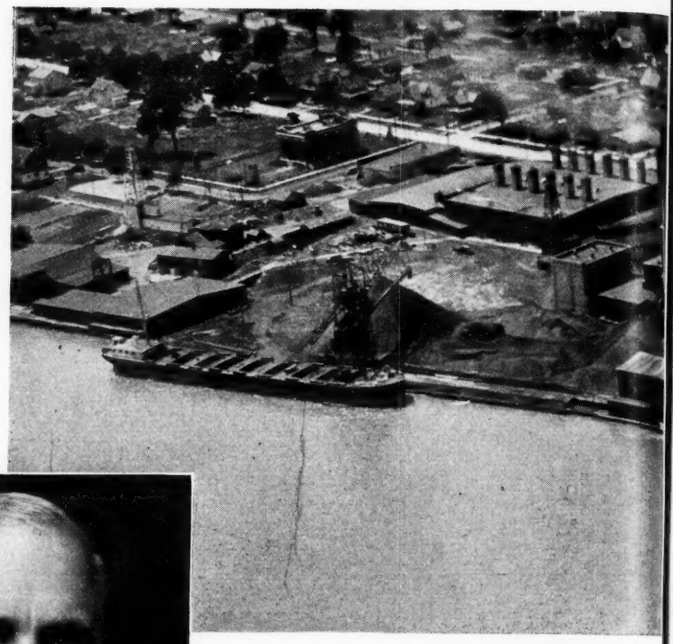
The bureau says that "the outstanding factors in the current world sugar situation are: a combined cane and beet sugar crop for 1929-30 slightly smaller than the record 1928-29 crop, but larger than that of any other year; unusually heavy stocks remaining from the large 1928-29 crop; a continued upward trend in world sugar consumption; and an unusually low price level for raw sugar. Stocks of sugar have accumulated at the principal world centers. The increase in world stocks at the beginning of the present season as compared with the preceding year was apparently enough to more than offset the slight decrease in world sugar production. Stocks of sugar in the United States, Cuba, France, and Netherlands are particularly heavy.

"Visible stocks at the beginning of the present sugar season at all United States ports, Canada, Cuba, the Philippine Islands, Java, and nine important sugar-producing countries of Europe were more than 700,000 short tons in excess of stocks at the beginning of the 1928-29 sugar campaign. World consumption has shown an upward trend over a series of years, but it has not kept pace with production. As a result, the world's visible supply of sugar is greater than in any previous year.

"The large supply of sugar is reflected in the low price level. The average wholesale price of raw sugar at New York for the year 1929 was 3.8 cents, as compared with 4.2 cents for 1928. This is the lowest on record since 1913, when the average for the year fell to 3.5 cents per pound. No improvement in prices is as yet apparent and the average for January, 1930, is placed at 3.7 cents, as compared with 3.8 in January, 1929, and 4.5 cents in January, 1928."

MASS DISTRIBUTION

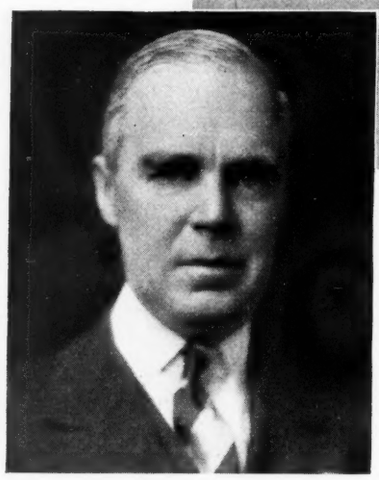
Charts Its Course



Plant of the Diamond Crystal Salt Company, St. Clair, Mich.

An Interview by O. Fred Rost With

COLBY M. CHESTER, JR.
President, General Foods Corporation



COLBY M. CHESTER, JR.

DRAMATIC, indeed, have been some of the changes that we have witnessed in the field of distribution of foodstuffs during the last decade. The entire structure of the food industries has been altered so materially that these changes might well be classed as a revolution.

Political revolutions occur generally as a natural sequence of extreme wastefulness and inefficiency in government. Eventually, they result in improved methods and greater efficiency. So it has been with this private revolution of the food industries. Food manufacturer, wholesaler, retailer, all have found it necessary to abandon wasteful habits, expensive procedures, cumbersome traditions, and get in step with the modern business standards.

In place of the old-fashioned grocer and butcher are rising a new generation of merchandising-minded, active, alert, independent food merchants. Likewise the easy-going, slow-moving wholesaler, with his impractical and poorly arranged warehouse and antiquated methods, has had either to go out of business or take a hitch in his belt, bring his methods and equipment up-to-date, do a highly constructive and co-operative selling job, and concentrate his sales effort in a limited area.

And the manufacturer, of course, has of necessity been forced to respond to this modern urge for drastic revision of tactics. He has had to come out of his shell of self-satisfaction, bring his equipment, his processes, his packages, his selling methods up-to-date, or see his business dwindle toward the vanishing point.

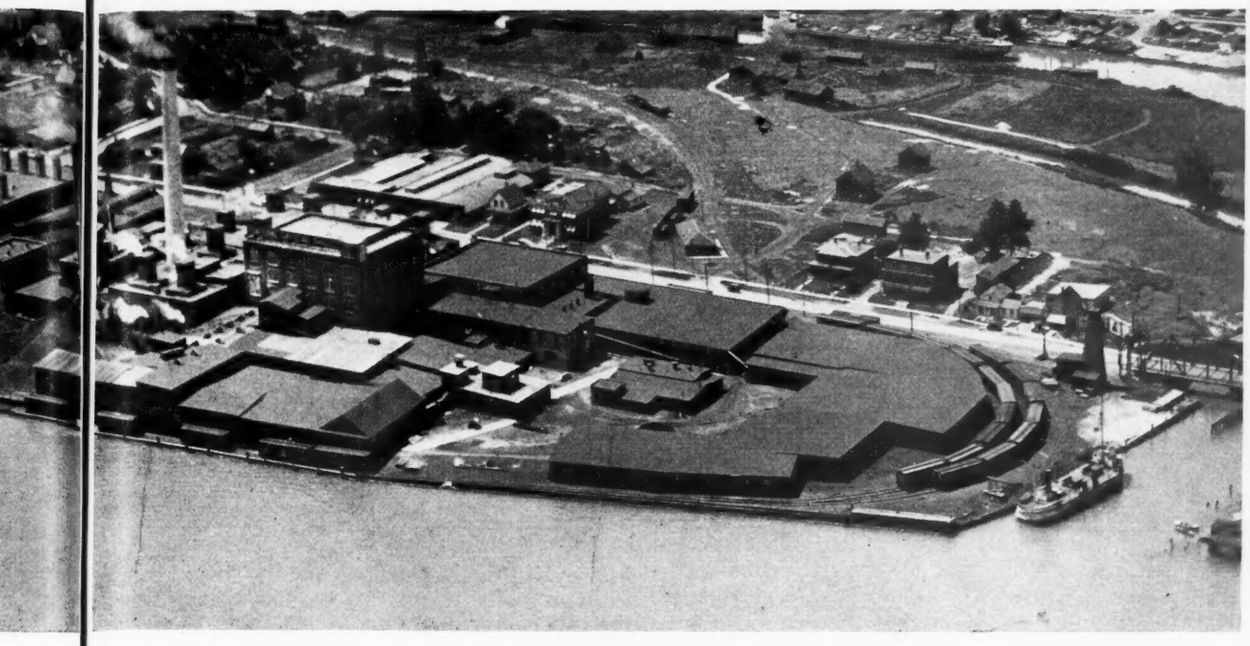
Quite aside from the specific improvements in products, practices, and methods of distribution which it called forth, this intra-industry revolution brought into focus a development which had never before been recognized as a factor in the food industry: mass distribution.

The story of General Foods Corporation is an intensely interesting one because it constitutes substantially a record of just what can be accomplished through well-organized production suitably co-ordinated with mass distribution.

"It probably will clear up many misunderstandings," says President Colby M. Chester, Jr., "if I tell briefly of the motives that prompted us to undertake the study and research work out of which naturally evolved the almost obvious product; our organization as you know it today.

"It is a well-known fact that the Postum Cereal Company, during the 30 years of its existence as a separate entity, built up and maintained a most unusual contact with all distributing branches of the industry. To come into the world's oldest industry with a novel product was an outstanding event in itself, and to do so in a comparatively brief span of years was up till then considered impossible of achievement.

"As the product gained in public favor, we gained in knowledge of the devious channels of distribution which the industry had long considered as inseparable necessities. It seemed to us that food products traveled from manufacturer or producer to the ultimate consumer along a course that had deteriorated into a system of well-worn ruts, often roundabout and wasteful.



"No practical or economic reason could be found for many well-established practices, and yet these were continued year after year. The stress of the post-war period has demanded not only that cost of production be reduced to the minimum but that charges for physical distribution of food products be cut to reasonable limits.

"The consumer naturally had a right to demand a more concerted effort on the part of the food industries to bring the purchasing power of the dollar nearer the 100 cents mark of 1913, instead of resting content with it at 63 cents, as late as 1925.

"The consuming public had been good to the Postum Cereal Company. Its sales had mounted from somewhat less than $500,000 in 1897 to the commanding figure of over $24,000,000 in 1924.

"WE felt that a survey of the situation might uncover some previously unknown field in which we could serve the public in a better way. A preliminary investigation showed that our increase in sales was out of all proportion to that of other comparable manufacturers, and that the ratio of increase was faster than that of the industry as a whole.

"One fact that this investigation uncovered proved of significance in shaping our future course. In 1923 a new product had been added, and with it all the extra effort and expense that such an undertaking involves, even though we did so without any increase in our sales or administrative expenses. Nevertheless, the following year our total sales volume increased 35.6 per cent and our net profit rolled up an increase of 42.5 per cent.

"Such performance, as far as we know, had never before been recorded and could almost be classified as a phenomenon in business. It led instantly and logically to the conclusion that if one product under given conditions could bring such results, a further extension of such process of expansion, if fostered under certain definite restrictions, could be expected to bring proportionate reward.

"Furthermore, such a result would place us in a position where we, as manufacturers, could pass on to the distributing branch of the industry, and the consuming public, some of the benefits that would naturally accrue to us. Thus we would be contributing to the lowering of the cost of living, while at the same time creating for the industry a compass pointing toward certain means for the elimination of waste in distribution, lower sales costs, and proportionately higher profits."

At this point Mr. Chester was reminded of the fact that he had not mentioned so far the considerations that the production side of the question must have received in the calculation. It was somewhat mystifying that the head of an enterprise that manufactured, or processed, in 1929 over $125,000,000 worth of food products should avoid—yes, seemingly evade—any mention of the subject that is generally closest to the heart of a manufacturer, namely, the problems of production.

His reply reflects how clearly he is convinced that today more than ever before the future success of a manufacturer depends upon the efficiency of his distribution.

"Frankly," replied Mr. Chester, "the part that production plays is today more or less taken for granted. There seem to be few industries that do not suffer from overcapacity and overproduction. There is no factory I know of that could not produce more goods if it could only find a market for them. You can find a factory to make almost anything you want and in any quantity. All this is due to the fact that in the past engineering talent and skill have been concentrated so completely on the productive functions of our industry that the equally important subject of distribution was neglected, with the result that production is not in balance with distribution.

"I have been impressed with this condition whenever we have taken over another unit, and its truth is demonstrated by the fact that many of the price reductions that we have been able to announce were made possible chiefly through savings in the cost of distribution.

"The fact of the matter is that our entire business structure is designed first of all to provide an organization for the mass distribution of related products by the most efficient and economical methods. Care was exercised in the selection of each addition to our line with the result that we have been able to fill in the valleys generally found in the sales chart of the average business,

and are now enjoying a fairly uniform volume throughout the year. This means also that our sales force operates with greater effectiveness, because always there are several of our products 'in season.'"

One of the problems that comes with the consolidation of two or more manufacturing enterprises that sell to the same class of customers is the question of what to do with the sales personnel. In most of the cases we hear or read about, a merger is followed by drastic reductions in the sales staff and often indiscriminate reversal of policies. There have been cases where the good will of one or the other merged company has been literally thrown to the winds through ill-considered dismissals of valuable sales talent, made under the guise of economy.

Mr. Chester has some definite opinions on this subject and does not hesitate to express them.

"It is true," he said, "that as a byproduct of the period of very rapid expansion through which we have passed, the fusing of the diverse sales organization presented a real problem. We recognized that the sales organization acquired by a merger constitutes a definite tangible asset, and as such forms a substantial portion of its value.

"The Postum Cereal Company had approximately 250 men on its sales force. Many of these were dropped with the approach of winter, because they were not needed. Through the various mergers the sales staff has grown until today the General Foods Corporation has upward of 700 men in the field. We have in the past and are today striving to keep every worth-while sales builder on the staff. To accomplish this, our sales policy has been rearranged quite materially. Through our 26 district offices we have effected a new division of sales territories.

"Each salesman covers a territory sufficiently small to enable him to call in most cases once each week on each customer assigned to him. The sales staff is trained to do constructive selling of our entire line, and they extend to the wholesaler or retailer a type of co-operation that will serve to weld more completely the relationship between us and our market. Obviously, also, having one salesman represent a large group of allied products not only effects a substantial saving for the manufacturer but saves much time for the wholesaler and retailer, who today need to interview but one salesman instead of several.

"Incidentally, I want to take this opportunity to deny most emphatically that there is any thought or intention on our part to eliminate the wholesale grocers. Most of the functions which justify the existence of the wholesaler cannot be performed as cheaply by any single manufacturer.

"Granted that to be true, it follows that a manufacturer who adjusts his policies on sales, transportation, and service to take the fullest possible advantage of the facilities that the wholesaler places at his disposal, is likely to register improved sales at a reduced cost. Similarly, the retailer will promote more readily the sale of products that reach him through a reliable and efficient wholesale organization.

"There is need, however, for discrimination in the selection of wholesale outlets if uniformly satisfactory distribution is to be secured. It is perhaps our close adherence to this principle, coupled with the co-operation given by our sales force, that has enabled us to speed up the movement of our various merchandise through the stocks of the wholesaler and retailer until today our products move, on the average, twice as fast as do most other similar products.

"It would be difficult to determine just what this doubling of the rate of turnover means to the wholesaler and retailer in the way of added profits, but that it represents a substantial amount cannot be denied. We look forward, nevertheless, to even greater acceleration of turnover through the recently inaugurated policy of having our own sales representatives check the stocks of General Food Products in the retail or wholesale outlets once each month. Incidentally, that plan will make possible more precise buying on the part of our customers and assure them of an increased rate of profit on the lines that are thus controlled."

It is generally understood that the different factories and production organizations have been left practically undisturbed since the General Foods Corporation took them over. Also there appears no change or reduction in the advertising effort in behalf of the fifteen groups of products now under one control. This knowledge, coupled with the facts that Mr. Chester had just related, prompted the query as to other specific economies that had been found feasible, and to what extent the savings in this system of mass distribution had been reflected in the prices of its products and the earnings of the company.

Said Mr. Chester: "The process of paring distribution costs, of course, is still going on. Several of the units have been acquired too recently to provide any basis for comparison. Immediately after we take over a plant, we ascertain that our standards of cleanliness, ventilation and illumination are complied with through-

Calumet baking powder is made at this plant in Chicago

Part of the Walter Baker chocolate factory at Dorchester, Mass.

out the establishment, and that mechanization has been carried to the necessary point of greatest efficiency.

"Aside from that, we leave the production mechanism of each unit function under direction already established, and our staff of experts addresses itself to the task of paring down non-productive overhead, and bringing the sales and distribution mechanism in tune with the accepted ideals, principles, and practices of our entire organization.

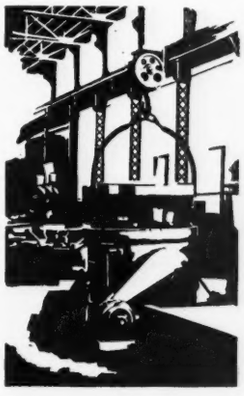
Accounting departments are transferred to headquarters, where the methods are changed to conform to our own standards. Transportation experts create shipping schedules so as to take advantage of lower rates and faster service through pooled shipments. The buying of raw materials is henceforth handled through our central office, where the volume of business we command, plus a close and continuous contact with the large suppliers, assures us of lowest possible prices.

"Your question as to actual reduction of prices cannot, however, be answered as completely as I should like. As you may have observed, the largest savings in operating costs undoubtedly have been accomplished through the massing of distributing functions of numerous related lines of products. We are by no means finished with our effort, for we intend to pare down these costs of distribution until all detectable waste has been eliminated.

"But already we can point to some very definite reductions in price, even though it has not been found advisable to make a general downward revision of prices on all General Foods Corporation products. As a specific instance, a group of six products, of equal or better quality, sells today at 19 per cent less than did these same products before we acquired control. What this means to the final consumer is best shown by the fact that if the sales in 1930 of those six products should equal those of 1929, the consuming public will have saved the very considerable sum of $11,357,000.

"Probably the best argument in favor of the system of mass distribution that we here have created, however, is found in the record of our earnings. Disregarding all precedents, and although we have passed through a period of five years of continual expansion chiefly through absorption of other non-competitive companies, our earnings have increased steadily and satisfactorily. Even during the first quarter of 1930 our earnings show a rate of increase that is even greater than that of our sales.

"It therefore appears that mass distribution, guided along the course of definite co-ordination of every function in the distribution of a group of related products, is capable of effecting such economies that the consuming public benefits by lower prices while the reward to the manufacturer remains unimpaired and even may be increased."



Abstracts of Current Literature

BABASSU NUTS. Alan Porter Lee. *Oil and Fat Industries,* Vol. 7, p. 91-3; March, 1930.

The babassu palm grows abundantly over large areas in Brazil, but has not been exploited as it deserves. The oil from babassu nuts is considered at least equal to coconut oil for most of the uses of coconut oil. There is a considerable demand in Europe, but exports from Brazil have not yet reached large tonnages. One advantage of the babassu nut for commercial utilization is that the husks can be distilled, yielding valuable chemical byproducts and a high-grade metallurgical coke, or they can be used as fuel. It is estimated that there are some billions of the trees in Brazil. The oil from the nuts closely resembles coconut oil, and is useful in making vegetable margarins, cooking fats, chocolate fats, soaps, toilet preparations, and light lubricants. The press-cake left from expressing the oil is an excellent cattle feed, fully equal to copra cake for this purpose. The oil of the nut is not the only edible product of the babassu palm; the mealy layer between shell and kernel is eaten by the natives and also is used for cattle feed. It contains tannin and starch. The sap of the palm also is used, both raw and cooked, and could be successfully utilized as a source of sugar. The extremely hard shell probably would yield high-grade decolorizing carbon by distillation.

* * *

USE OF BUTTERMILK IN OVERCOMING ALKALINITY. J. T. Clarke. *Bakers Weekly,* Vol. 65, p. 80; Feb. 15, 1930.

The reaction of alkaline waters on dough fermentation produces undesirable effects in the finished loaf of bread. By neutralizing the alkalinity of the water with vinegar, improvement in the bread follows. Experiments have shown buttermilk powder to be superior to vinegar in supplying acid to doughs in overcoming the alkalinity of water, and produced a more lively dough and a superior loaf even to that obtained with vinegar. The quantity of buttermilk powder to be used depends on the alkalinity of the various waters. Although the acidity of powdered buttermilk varies from 0 to 8 per cent, the average free acidity is 4½ per cent.

COMPOUND CLARIFICATION. *Facts About Sugar,* Vol. 25, p. 120; Feb. 1, 1930

Colloids in cane juices reduce evaporation rate and interfere with crystallization, thereby increasing sucrose losses in the molasses. They also reduce the effective capacity of filtering and decolorizing units, so that final yield is still further decreased. Following improved behavior of cane juices after compound clarification, the Carbohydrate Division of the U. S. Bureau of Chemistry and Soils made an investigation of the process as it affects the colloid content of cane juice. Compound clarification is a modified form of double defecation, utilized in the Petree process. The procedure is to pump the primary juice and the clarified secondary juice together through the primary juice heaters to the primary Dorr, from which about 95 per cent of the mixed juice leaves as clean, clear juice at 209-212° F. The secondary juice, containing most of the gummy and colloidal matter, is limed separately, mixed with the settlings from the primary clarifier and pumped through the secondary juice heater to the secondary Dorr. The resulting mud has a dense, granular structure which favors rapid filtration, requiring only half the filter-press capacity needed for open defecation. The excellent filtering properties of this mud cause formation of a firm cake, easily separated from the cloths. This prolongs the life of filter cloths, plates, and frames, speeds up the filtration, and reduces sucrose losses. All factories which have tried compound clarification have observed increases in boiling-house efficiency; some report that they can handle 6 to 9 per cent more juice in evaporators and vacuum pans than was possible with open defecation.

* * *

CANNING IRRIGATED PEACHES. P. F. Nichols. *Fruit Products Journal,* Vol. 9, p. 211-3; March, 1930.

To test the validity of the common belief that canning quality of peaches is injured by irrigation within two weeks prior to harvest, the University of California (Division of Viticulture and Fruit Products) has made some comparative tests. These tests were made with clingstone peaches, from wet and dry plots, during the canning seasons of 1926, 1927, and 1928. In the first season, sample boxes of fruit from each wet and dry plot were shipped to the experimental cannery at Berkeley, where they were canned without grading. Members of the Fruit Products staff and a few commercial canners who were invited to make comparisons, were unable to find any consistent change in quality due to irrigation. In the next season the samples were sent, with regular carloads of fruit to commercial canneries for storage and canning under commercial conditions. They were graded upon arrival, and all but two boxes from each lot of ten boxes were canned after remaining in common storage 36 hours. The remaining two boxes were sorted twice a week for two weeks, and the sound fruit remaining was finally canned. After some months of storage the cans were inspected, under code numbers unknown to the judges. There was considerable variability in the judgments made; in some cases irrigated peaches were judged better, in others the dry plot peaches were rated higher. Judgments as to whether the samples came from wet or dry plots were correct in 64.3 per cent of the observations, incorrect in 35.7 per cent. There was some evidence that bruised fruit was more common in the irrigated peaches; but if allowance is made for stem bruising due to the somewhat larger size of the irrigated fruit, the amount of difference in this respect is hardly large enough to be significant. The conclusions drawn from the 1928 season, in which a somewhat different test procedure was followed, agree with those of the preceding two seasons. In general, it was found that irrigation of peaches up to and including the time of harvest does not discernibly injure their shipping and canning quality.

* * *

QUICK FROZEN FOODS. Clarence Birdseye. *Refrigerating Engineering,* Vol. 19, p. 75-9; March, 1930.

Balsa wood and sheet cork, originally used for shipping chilled or frozen foods, are too expensive to meet the growing demand for transportation of frozen foods in an insulating container. Experiments with fiberboard, however, indicate that this material when properly used has practically as much insulating effect as balsa wood or cork. On the basis of these experiments, a container was designed with inner and outer walls of corrugated fiberboard, about 2 inches apart. The space between may be filled with kapok, cotton linters, or the like. The cost of this type of container, with a capacity of about 30 pounds of chilled package fish fillets, is about 80 cents, whereas a balsa-wood container for the same purpose would cost $12 to $15 and would have to be used repeatedly to bring its cost per trip within reasonable limits. For quick-frozen foods, less insulation is required and a simpler design has been adopted. The cost for the

30-pound size is about 25 cents. These containers are excellent insulators for heat loss, but they are permeable to air and moisture, and so do not prevent desiccation, odor absorption, and the like. Frozen foods should be packed in individual cartons of a kind to provide this protection. The containers can be so designed that they can be sent by express across the continent without spoilage. The essential features of the quick-freezing process are discussed, to show how, by preventing cell rupture, original freshness is preserved in fish, beef, and other foods. Photographs and curve charts are shown, to illustrate the practical results obtainable in the distribution of quick-frozen foods.

* * *

EMULSIONS. John E. Rutzler, Jr. *Oil & Fat Industries,* Vol. 7, p. 61-3; February, 1930.

The subject of oil and fat emulsions is reviewed, as being of interest to those who sometimes have occasion to make or break them, or to use them in manufacturing operations. Theoretically, any concentration is possible either in the water-in-oil or the oil-in-water types of emulsions. Simple oil-in-water emulsions which, so far as can be ascertained, do not have any peptizing agent are known, but the oil concentration in these does not exceed about 2 per cent. For more concentrated oil-in-water emulsions, or for water-in-oil emulsions, a peptizing agent must be present. Equipment for making emulsions includes high-speed agitators, colloid mills, triturating apparatus, etc. For breaking emulsions (coalescing the oil and water phases), acidification sometimes is effective, by destroying the effect of the peptizing agent. Bringing the emulsion to its isoelectric point also sometimes causes coalescence. Filtration, freezing and electrical treatments also are utilized sometimes for breaking emulsions. Soaps of sodium or potassium generally are useful as peptizing agents; but soaps of calcium, magnesium, and like metals do not usually favor emulsification. The viscosity of oil-in-water increases rapidly with the oil concentration; very stiff emulsions can be made with relatively little oil.

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COOKIE PRODUCTION AND MANUFACTURE. C. A. Glabau. *Bakers Weekly, 64,* 54; Dec. 28, 1929, and *65,* 74; Jan. 4, 1930.

The volume of business done by the bakery is a point for first consideration in preparing to manufacture cookies. The machinery should be put in the right place so as not to interfere with other equipment. Photographs of equipment layouts and accompanying descriptions are given. The selection of proper materials, as flour, shortening, eggs and flavoring, is very important. The next article will discuss formulas and methods for producing different types of cookies.

HAM BOILING. C. E. Macmillan. *Industrial Gas,* Vol. 8, p. 25-6; March, 1930.

A modern installation for boiling hams is described and illustrated. Emphasis is placed on uniformity of results; under-boiling causes consumer dissatisfaction, and over-boiling has a like effect, with the added disadvantage of a weight loss which cuts down profits. Two boiling tanks are used, each being 10 feet x 45 inches x 37 inches. Water in these tanks is heated to simmering temperature (180° F.) and held there 6½ hours. The hams are placed in individual aluminum containers which are oblong, pear-shaped, and truncated. Shape of the hams is retained by pressure exerted by coil springs on the covers. Gas is used for fuel, because of its uniformity, ease of control, and flexibility of operation. Flexibility is particularly essential for processing hams, because the demand for the product has wide seasonal and even day-to-day fluctuations. A calculation of fuel costs for operation of two boiling tanks of the specified size revealed an over-all cost of $290 per month for coal and $123.20 per month for gas. The boiling tanks are equipped with Ensign-Reynolds Staylite burners and immersion coils. The gas is supplied at a maximum of 4 pounds pressure by rotary air-cooled compressors having bypass relief valves. High-pressure gas inspirators provide air-gas mixtures suitable for complete combustion at all rates of burning the gas. The tanks are heavily insulated, which not only helps to keep the boiling room cool but gives better than 80 per cent operating efficiency for the tanks. When the hams are cooked they are allowed to cool in their containers, then refrigerated for 12 hours at 45° F. To remove the aluminum containers, they are placed in a tank of warm water. After removal from the containers, the hams are chilled to 38° F. and sent out on ice trucks to customers.

* * *

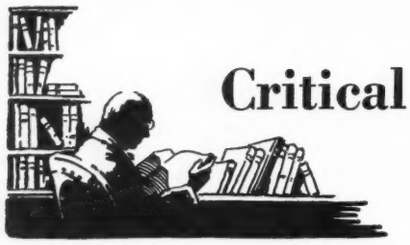
PASTEURIZED DRIED FRUITS. Carl R. Fellers. *Fruit Products Journal,* Vol. 9, p. 214-6; March, 1930.

Dried fruits harbor a number of varieties of micro-organisms, including molds and yeasts. It has even been demonstrated that transmission of disease germs on dried fruit is possible. To prevent growth of organisms, and resultant spoilage, the moisture content should range from 20 to 30 per cent; but some molds will grow even when the moisture content is as low as 10 per cent. Sulphuring, which is common practice with apples, pears, peaches, apricots, and some kinds of grapes and figs, helps much to retard growth of molds and yeasts. Prunes are not ordinarily sulphured. To aid in prevention of spoilage of dried fruits, experiments were made to ascertain whether pasteurization would injure quality. Preliminary trials indicated that dates, raisins, and prunes can be pasteurized effectively without injury to their texture or flavor, but that results with figs are much less favorable. The trials with dates were so favorable that large commercial pasteurizers have been installed by Hills Brothers, who find that appearance, texture, and flavor of the product are actually enhanced. The dates are treated in their retail cartons and are not handled thereafter. Further experiments showed that various dried fruits can be pasteurized in paper or metal cartons, using moist heat. Temperature and humidity must be accurately controlled for best results. Optimum conditions vary with the kind of fruit and container, but generally come within the temperature range from 150 to 185 ° F., with 70 to 100 per cent humidity and a heating time of 30 to 70 minutes. Development of commercial processes for other fruits is in progress. It has been observed that acid fruits are more easily pasteurized than those of low hydrogen ion concentration. A tabulated report is given of the bacterial, mold, and yeast counts from a large number of samples.

* * *

HOG PROCESSING. J. B. Nealey. *Industrial Gas.* Vol. 8, No. 8, p. 15-6; February, 1930.

A modern abattoir in which the processing of hogs has been thoroughly mechanized, somewhat after the manner of the assembly line in an automobile factory, is described. The processing line has a motor-driven overhead chain conveyor, with hooks at intervals for carrying the slaughtered hogs through the various dismemberment processes. It begins with a bleeding rail which runs into the scalding vat, then to a dehairing machine. The dehaired hogs are conveyed through a gas-jet device which singes off any remaining hair; this is followed by scraping, after which the numerous steps of the dismemberment process begin. The abattoir has six mechanically refrigerated chill rooms and eight gasfired smoke houses. Smoke is generated from hickory sawdust by heat from long gaspipe burners placed just above the sawdust. Temperature records are kept, using a recording pyrometer on the top floor of each smoke house. The smoking is continued for 24 to 48 hours. An entire 5-story building is devoted to the curing of hams, shoulders, cottage butts, feet, and the like. The capacity of each floor is 1,500,000 pounds, and pickling or curing processes last 60 to 90 days. Sausage casings are filled by machine, under 120 pounds air pressure, in lengths of 6 to 18 feet. These are linked by hand and hung in festoons on a conveyor which carries them into the gas-fired sausage smoke houses, of which there are seven. The fat is rendered in a tank house, using steam under 40 pounds pressure. The residue from rendering the lard is worked up for hog feed.



Critical Book Reviews

FINDING AND STOPPING WASTE IN MODERN BOILER ROOMS. Published by Cochrane Corporation, Philadelphia, 1928. 788 pp. Price, $3.

ONE is impressed by the tremendous amount of labor involved in the preparation of this book. In order that credit be given where it is due, it should be stated here that George H. Gibson is the editor of the volume, although neither his name nor that of collaborating editors appears in the book. This is not an elementary work. Rather is it a post-graduate treatment of the problems of steam generation. In it are sections on Fuels, Combustion, Heat Absorption, Boiler Efficiency and Testing, and Feed Water Heating and Conditioning.

From the standpoint of the food manufacturer, those establishments having large steam plants will find this volume of greatest usefulness when it is in the hands of the chief engineer, but in smaller plants, where the plant executive must include the function of chief engineer, the book will be an important addition to the office library.

The publisher of this accumulation of knowledge is the Cochrane Corporation, maker of feed-water heaters, filters, valves, water softeners, and the like, yet the only mention of Cochrane equipment is a very small group of pages at the close of the work, printed on colored paper—a most commendable modesty.

L. V. BURTON.

* * *

FOOD PRODUCTS DIRECTORY OF THE PACIFIC COAST AND ROCKY MOUNTAIN STATES. W. J. McCamman, Publisher, 1202 Hearst Bldg., San Francisco, 367 pages. Price, $6.50.

THIS is a directory of canners, packers and manufacturers of food products; packers and shippers of fresh and dried fruits; and dealers in nuts, beans, grain, and rice in California, Oregon, Washington, Alaska, Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Wyoming, British Columbia, Hawaii, and Lower California, Mexico.

The first section gives names of firms, officers, location of main office and plants, commodities packed, brand names and how the products are packed, as tin, glass, and so on. The second section is an index of products packed, with the names of firms packing them. In addition to ordinary fruit and vegetable products, this section includes sea foods of all kinds, condiments, bakers' and confectioners' specialties, and wines. Here are listed such unusual products as canned baked apples, caviar, cockles, liver and bacon, mussels, nopalitos, (young cactus), saraches, reindeer meat, scallops, and squid. In the third section the towns are alphabetically listed by states, with the names of the food manufacturers located in them. The fourth section is an index of brands, with the name of the packer or owner of them.

Packers and shippers of fresh and dried fruits and nuts are indexed with the brand names of these products in a separate index. There also is an index of dealers and shippers of beans, grain, and rice and a list of supply concerns and food brokers and exporters. The list has been corrected up to June 1, 1929, and the book should be valuable to buyers of Western made food products and sales departments of firms selling to Western food manufacturers.

E. D. STEWART

* * *

PROCESSING THE SOYBEAN. By O. R. Sweeney, L. K. Arnold, and J. H. Arnold. Bulletin 183, Engineering Extension Service, Iowa State College, Ames, Iowa. 46 pp.

A BRIEF review of the place of the soybean in American agriculture; its position as a source of vegetable oil, together with an economic study of domestic vegetable oils; and a fairly detailed survey of the methods of producing soybean oil is provided in this bulletin. Particular emphasis is placed upon the extraction method of production. Plant designs and cost estimates for erection and operation are given for units with 10 tons daily capacity. The purpose of the bulletin is to encourage the soybean industry in Iowa.

* * *

BAKTERIOLOGISCHE FLEISCHBESHAU (BACTERIOLOGICAL MEAT INSPECTION). By R. Standfuss. Second edition. 172 pages, 4 color plates, 20 figures. Richard Schoetz, Berlin, 1928.

THE AUTHOR has compiled this work for its application to the problems of meat poisoning with members of the *paratyphi-enteritidis* group of bacteria. The first one-third of the book deals with historical considerations and the presentation of statistical data embracing all recorded outbreaks of meat poisoning in Germany for the past several years. The writer goes to some lengths to correlate these outbreaks (especially 113 which he himself investigated) with various disorders of the animals before slaughter. His contention is that the usual origin of meat poisoning is this prior infection of the animal with members of the *paratyphi-enteritidis* group and that human carriers are of only secondary importance. The second one-third of the book takes up the bacteriology of the *coli-typhi* group, the differentiation, classification, and the like of members of the *paratyphi-enteritidis* group, and the procedures in bacteriological meat inspection.

The remainder of the book (II Teil) is devoted to the procedures found most valuable during the past six years of operation of the government investigation service at Potsdam. Detailed directions are given for everything from the equipment of a laboratory to the interpretation of the various tests. An appendix presents a good discussion of canned meats and methods (physical and bacteriological) of examining and judging same. A bibliography is given of over 250 references, of which all but 12 are of German origin. The work is well indexed. W. S. STURGES.

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Government Publications

DOCUMENTS ARE AVAILABLE *at prices indicated from Superintendent of Documents, Government Printing Office, Washington, D. C. Send cash or money order; stamps and personal checks not accepted. When no price is indicated pamphlet is free and should be ordered from bureau responsible for its issue.*

Statistics of Oats, Barley, and Grain Sorghums. U. S. Department of Agriculture Statistical Bulletin 29; 25 cents. Gives figures for year ended Dec. 31, 1928, with comparable data for earlier years.

Fruit Juice Markets. Bureau of Foreign and Domestic Commerce Trade Information Bulletin 683; 10 cents. Describes markets for fruit juices and fruit sirups in Continental Europe.

Sanitary Engineers' Transactions. U. S. Public Health Service Bulletin 196; 20 cents. Transactions of the Ninth Annual Conference of State Sanitary Engineers.

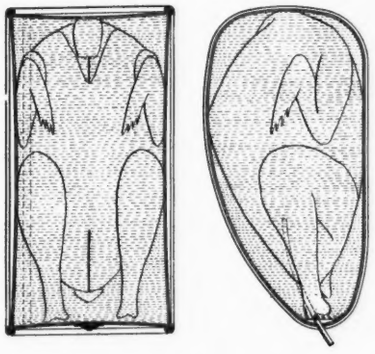
Sorgo for Sirup Production, by H. B. Cowgill. U. S. Department of Agriculture Farmers' Bulletin 1,619; 10 cents. Discusses culture, harvesting, and handling.

Fresh and Canned Fruit Industry of Porto Rico, by J. R. McKey. Bureau of Foreign and Domestic Commerce Trade Information Bulletin 669; 5 cents.

Foreign Commerce and Navigation of the United States in 1928. Bureau of Foreign and Domestic Commerce statistical volume covering imports and exports for the calendar year 1928; $1.50.

Selected Patents

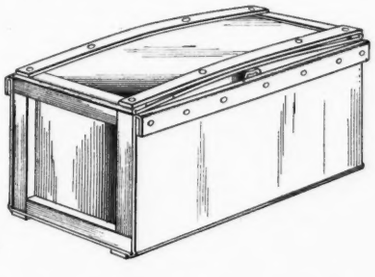
Canning Poultry — Jay C. Hormel, Horace H. Corey, and Edwin J. Cashman of Austin, Minn., to George A. Hormel & Company, Austin, Minn. No. 1,740,176. Dec. 17, 1929 — Dressed poultry is seasoned, cooked, preserved, and kept in its natural form in a metal container with flexible walls. These walls bend inward when vacuum is applied and prevent movement of the carcass. Previous to evacuation and cooking, a hot jellifying solution con-



taining proper seasoning is injected into the can by a tube, as shown in the left-hand figure, to fill all voids within and around the fowl. Air is then exhausted from the container. It is sealed, and cooked in a pressure cooker. Upon chilling the jelly sets, thus supporting the carcass and preventing extraction of juice.

* * *

Fiberboard Shipping Case for Citrus Fruits—Harrison B. Walther, Chicago, Ill., to Container Corporation of America, Chicago, Ill. No. 1,741,214. Dec. 31, 1929—In a shipping case for citrus fruits, it is said to be essential, in order



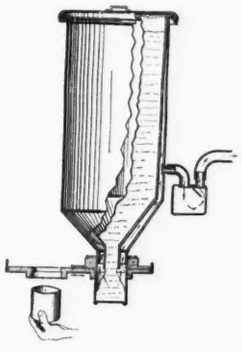
that the recipient of the fruit will regard it as fresh, that it be so tightly packed that the box will be bent upward at the middle. If this bulge is not apparent, it is thought that drying out has taken place. This form of packing box, formerly made with sides of wood veneer, is now carried out with fiberboard. The body of the box is made from a blank creased to provide the bottom and two sides of the case, with extensions at the ends of the blank folded back themselves, and wooden strips are secured within the folds as well as along the bottom lateral edges of the blank. The end panels are composed of an open wooden frame and a fiberboard sheet nailed upon it. The middle frame is composed of a wooden frame and fiberboard which passes over the top edge and covers both sides. Wooden strips are used also on the cover, as shown in the drawing. Holes in the fiberboard near the bottom of the box aid in ventilation.

* * *

Preserving Egg Yolks — Thomas M. Rector, Rutherford, N. J., to Emulsol Corporation, Chicago, Ill. No. 1,744,575. Jan. 21, 1930—The emulsifying qualities of egg yolks are preserved by adding a quantity of salt sufficient to saturate the moisture content of the yolk previous to refrigeration. Freezing, ordinarily used to preserve such eggs, will cause the yolk to form a jelly-like mass when thawed, but the addition of salt, by preventing freezing when the material is stored at or below 32° F., will cause the yolks to return to their original condition. Although other substances, such as glycerine, have been used for this purpose, salt must be added anyway when making mayonnaise, and is therefore said to be entirely unobjectionable.

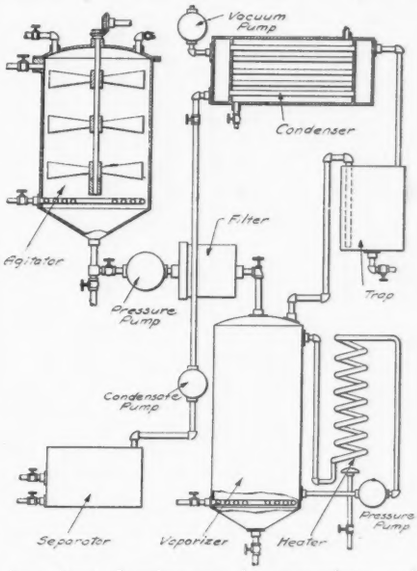
* * *

Cartoning Ice Cream—Harry T. Cornell and Michael H. McPartland, Binghamton, N. Y., to General Ice Cream Corporation, Binghamton, N. Y. No. 1,748,111. Feb. 25, 1930—In filling ice



cream cartons at a high rate of speed, the device shown in the illustration permits the maintenance of a vacuum during the insertion of the empty cartons and the removal of the filled ones. The speed of operation is said to be limited only by the ability of the operator to interchange empty cartons for full ones and move the slide back and forth.

Producing Edible Oils From Crude Cottonseed Oil — William Kelley, Los Angeles, Calif., to Filtrol Corporation of California. No. 1,747,675. Feb. 18, 1930—An edible oil of superior qualities is said to be produced from crude cottonseed oil without the use of caustic and its accompanying loss of material. The agitator (1) is filled with crude oil, heated to about 115° F., and about 10 per cent of water added. After agitation



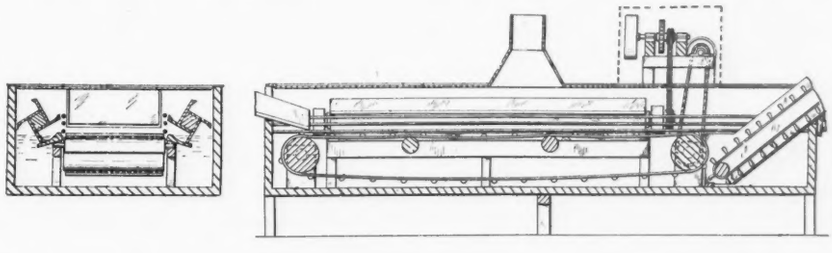
for about 5 minutes, the coagulate and water are allowed to settle and are drawn off. The oil is then agitated with an acid-activated absorbent clay at about 212° F., and finally filtered and heated to about 450° F. under an absolute pressure of 60 millimeters of mercury or less, in the presence of steam, to distill off free fatty acids.

* * *

Producing Tomato Juice — Walter J. Kemp, Kokomo, Ind. No. 1,746,657. Feb. 11, 1930—Pure tomato juice for beverage purposes is made by extracting juice, with the strained particles of pulp and fiber included, by constant pressure without agitation. The product is then homogenized to break up the pulp particles and put them into permanent suspension, and pasteurized previous to bottling or canning.

* * *

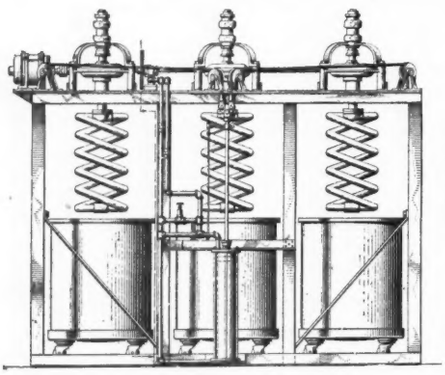
Apparatus for Removing Spray Residue and Sterilizing Fruit — August Guignard, Hood River, Ore. No. 1,748,019. Feb. 18, 1930—Spray residue, as well as bacteria or other microorganisms, are removed from such fruit as apples and pears by first subjecting them to washing with a specific treating solution, then to a washing with fresh water and finally to a drying by a number of brushes. The treating tanks are



made as shown in the figure. An endless belt conveys the fruit through the unit, the belt passing over rollers in such a way that the entire surface of the fruit is exposed some time during the passage. Agitation of the solution is provided by a vaned impeller disposed longitudinally on either side of the treating tank. The elevator belt on the right removes the fruit from the first treating unit and they then enter a similar unit in which washing takes place.

* * *

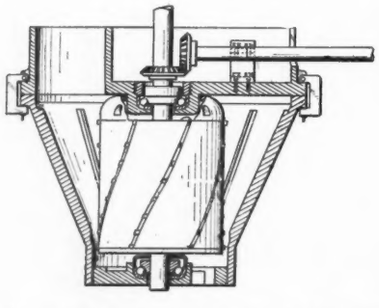
Sterilization of Liquids—Aage Jensen, Los Angeles, Calif. No. 1,738,953. Dec. 10, 1929—An apparatus for the pasteurization of milk and cream, ice cream production, and the processing of fruit juices and the like makes use of a rotating coil suspended in the liquid and through which steam, brine, and water is circulated. The use of a single unit for the process has been found objectionable, because the treated liquid must re-



main in a single container during processing and then be transferred to individual containers for transportation or sale. Furthermore, introducing the various treating mediums, such as steam and refrigerated brine, through the same coil causes waste and the danger of corrosion. In the present invention, the liquid treated remains in the original container, which may be used as the shipping container, and a separate coil unit is used for pasteurizing, for water cooling, and for brine cooling. As shown in the illustration, the containers pass from beneath one coil to the next, and provision is made for raising and lowering the coils into the liquid.

* * *

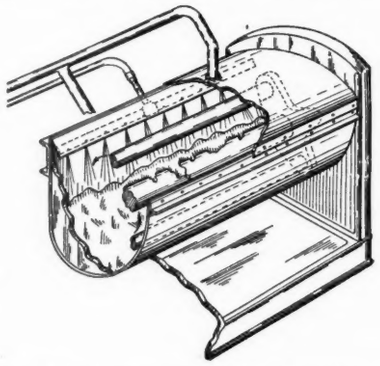
Apple Grinder — Lewis C. Hufford, Redondo Beach, Calif. No. 1,746,654. Feb. 11, 1930—The grinder illustrated is said to be especially efficient on apples or similar fruits and vegetables. The



objects to be ground are caught between the conical walls and the revolving central portion. The angular formation of the bars aids gravity in moving the objects downward, and the teeth on the revolving drum rasp and cut them, at the same time turning them over to expose new surfaces. The disintegrated product is discharged at the bottom.

* * *

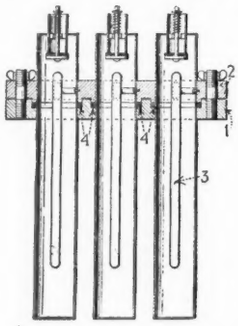
Mixing Dough in a Water Spray — Julius E. Wihlfahrt, New York City. No. 1,725,036. Aug. 20, 1929.—Only a portion of the water is mixed with the ingredients originally introduced into



the mixer. The remaining portion is added by spraying a film of water between the mass being mixed and a wall of the mixer, thus lubricating and cooling the wall of the mixing device.

* * *

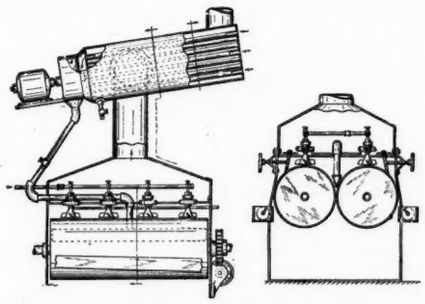
Freezing Soft Drinks on Sticks—Harry A. Mundorff, Jr., Wilmington, Del. No. 1,743,375. Jan. 14, 1930—In making a confection composed of a carbonated beverage frozen on a stick, it is necessary to prevent the escape of the carbon dioxide gas from the liquid during the freezing operation. The molds



shown in the illustration open at the junction of plates *1* and *2*, and the wooden sticks, *3*, are snapped in a clip. Gaskets at *4* seal the molds when they are again assembled, and the carbonated liquid is injected through the valves on the top. The unit of molds is then refrigerated without releasing the pressure until the product becomes solid.

* * *

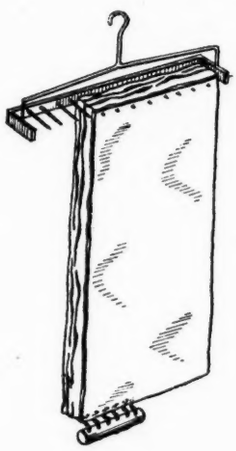
Process of Drying Milk—Chris M. Peterson, Minneapolis, Minn., to Ward Dry Milk Company, St. Paul, Minn. No. 1,748,618. Feb. 25, 1930 — Milk is centrifugally projected in a finely divided condition upon drums the interior of which are heated. As the drums revolve, the milk solidifies in a thin layer, the vapor passing upward to heat air, which is then pumped down through the triangular nozzle between the rolls to



aid in the drying operation and carry away foreign odors. The dried milk is scraped from the rolls and falls to the bin below after it is completely dried. Close regulation of the temperature and speed of the rolls permits most efficient operation without danger of scorching.

* * *

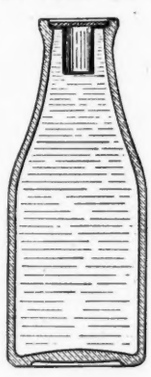
Hanging Bacon Bellies in Smoke — William D. Honohan, Chicago, Ill., to Swift & Company, Chicago, Ill. No. 1,745,013. Jan. 28, 1930—In the production of bacon, the shape and appearance



of pork bellies is improved during the smoking or curing process by suspending the side of bacon from one end, and off center near the belly side. A weight is then hooked to the lower end near the belly side to stretch the shoulder crease out of the skin and minimize shrinkage at this side.

* * *

Milk-Bottle Cap to Hold Solid CO_2—Erik A. Pearson, Portland, Ore. No. 1,731,539. Oct. 15, 1929 — A small waxed-cardboard receptacle forms part of the milk bottle cap, as shown in the illustration. A small quantity of solid carbon dioxide is placed in the receptacle, and a paper liner in the form of an inverted cup is put over it, to the end that the escaping gases are forced to travel up the outer sides of the receptacle to escape. The ordinary type of paper closure disk, with a small hole in it for the escape of the gas, is then put on.



Manufacturers' News And Equipment

Emulsion Stabilizer

A NEW emulsifying and stabilizing agent has recently been developed by the Hull Company, of 130 Clinton Street, Brooklyn, N. Y. The material is a powder, which, when dispersed in water, is suitable for stabilization of oil in water emulsions.

If no other emulsifying agent is being used, this stabilizer can be used for complete preparation of an emulsion. The emulsions manufactured with this product include such diverse products as rose-honey-almond emulsion, automobile polish, flavoring extracts, insecticides, and a variety of food products. The product is neither acid nor alkaline and is said to give a smooth, stable emulsion.

Fan Cooler Has Novel Features

THE Niagara fan cooler, a new product of the Niagara Blower Company, Buffalo, N. Y., is particularly suitable for maintaining temperatures lower than normal atmosphere conditions in work or storage rooms in which cool and relatively dry air is necessary, but where precise control of humidity would be superfluous.

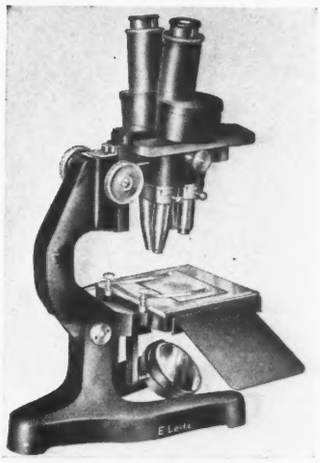
The cooling coils through which brine is circulated are composed of standard $\frac{3}{4}$-inch pipe. A fin is inserted in a spiral groove and knurled to the steel, giving both a thermal and mechanical bond. The tubes are hairpin shaped and are welded to the header plate. The coil assembly is tinned throughout. A drip pan and drain are provided for removal of condensed moisture.

The equipment can be kept comparatively clear of frost at all times by a defrosting arrangement in which the flow of brine and air is reversed.

Microscope Permits Quick Change of Objectives

A NEW wide-field binocular microscope with an automatic multiple-objective nosepiece has recently been introduced by E. Leitz, Inc., 60 East 10th Street, New York City. Especially in production work is the instrument of value, due to the rapid manner in which objectives are changed, a new feature for binocular microscopes. A spring stops the objective so that it is correctly aligned with the optical system. The prism body gives a pronounced stereoscopic effect.

The wide field of the instrument permits the examination of large areas, making it especially valuable for comparisons and examinations of grain, seeds, fibers, etc., and in grading work. A range of magnifications from 5 to 216 diameters is available. The microscope has a high eye-point, making it possible for the observer to wear



spectacles. It is furnished in a variety of stands to suit conditions of use, one of which is shown in the illustration.

Experimental Quick-Freezer Uses Solid CO_2

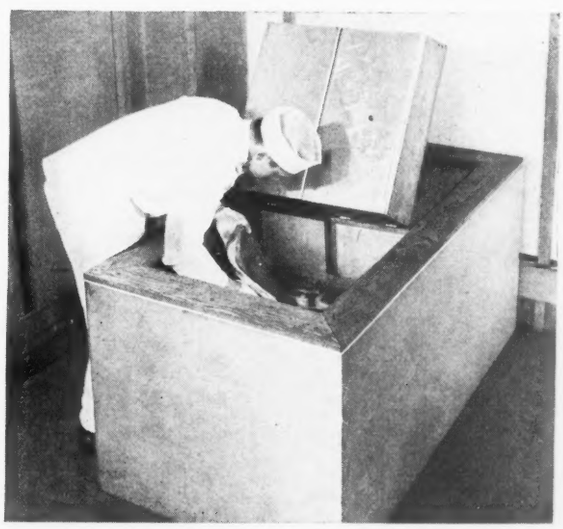
AN "Introductory Meat Freezer" that provides a means for conducting quick-freezing on a scale sufficient for technical and merchandising experimentation has been introduced by the Dry Ice Corporation of America, New York City. The freezer has a capacity of 150 pounds of 1-inch cuts per hour.

The bottom of the freezer, which is heavily insulated, is filled with 8 10-inch cubes of solid carbon dioxide (dry-ice) having a temperature of —109.6° F. The cuts to be frozen rest on an aluminum plate laid over this refrigerant. Hinged covers with bottoms composed of aluminum, contain compartments into which additional cakes of the solid carbon dioxide are placed. These covers are laid over the material to be frozen. The product is frozen both by conduction through the aluminum plates and by circulation of the cold carbon dioxide gas.

Fish fillets $\frac{5}{8}$-inch thick are frozen in

New cooler keeps workrooms comfortable

Freezing steaks with solid CO_2



from 3 to 5 minutes. Pork chops 1-inch thick freeze in about 12 minutes, heavier cuts requiring correspondingly longer time.

Although operating costs with this freezer are somewhat higher than methods of quick-freezing using cold brine in a permanent installation, its convenience, mobility, and low initial cost make it especially suitable for experimentation.

New Container Gives Air Circulation

ADVANTAGES that appeal to the packer and consumer alike are combined in an "open-end, open-top" carton that has been adopted by the G. M. Peet Company, who has marketed over Mich. The carton is formed from a flat piece of paper board waxed on the inside, die-cut, and scored to fold in such a way that openings in the top and end provide visibility and circulation of air. Cold waxing prevents absorption of moisture and adds to the appearance of the exterior. The package is fairly rigid, but is partly supported by the material packed within it. It is held together by a string or rubber band, no glue or staples being used.

The circulation of air made possible by the carton is said to eliminate sweating of the product, making it especially suitable for fresh or cured meat products such as sausage or bacon. Ease of refrigerating the product also is a factor.

Tests of sales appeal by the G. M. Peet Company, which has marketed over 100,000 pounds of sausage in this style

of package, show that novelty, in addition to visibility, is a valuable point. According to this company's experience, the package is cheaper than transparent wrapping materials and packaging labor costs also are low. Sutherland Paper Company, Kalamazoo, Mich., has been licensed to manufacture and market the carton.

Colorimetric Analysis

OILS AND FATS are prominent among the substances which may be satisfactorily tested by an analysis of the transmitted or reflected light with a new type of photo-electric color analyzer recently announced by the American Photoelectric Corporation, 215 Third Avenue, New York City.

The light is analyzed by the apparatus without the use of the human eye. A spectrometer divides the light into a number of narrow bands of the spectrum, and the light intensity of each band is measured with the photo-electric cell. A sufficient number of bands are measured to permit the plotting of an accurate curve of intensity at various wave lengths over the desired color range. Measurement of a single point on the curve may be made in about 15 seconds by a non-technical operator of average intelligence, and a complete analysis requires up to five minutes.

The instrument uses as a source of light a small incandescent lamp operated by a storage battery. There are, in addition, a spectrometer, a slide carrying a sample to be analyzed by transmitted light, a box containing the photo-electric cell and the greater part of the electrical circuit, one side of the box carrying the control panel, and, finally, a Wheatstone bridge of the Kohlrauch type which is balanced with the assistance of a galvanometer. Light from the source enters the spectrometer, where a spectrum band about 5 millimicrons wide is isolated by means of a slit and allowed to fall upon the sample slide.

The slide may be moved to three positions. The first permits the passage of no light and enables the operator to adjust the instrument for zero intensity. The second position interposes an unobstructed opening between the spectrometer and the photo-electric cell, whereupon the operator makes an adjustment for 100 per cent light intensity of the wave length being measured. The third position places the sample in the path of the light. When the bridge is balanced in this position, the reading is a measure of the intensity of the transmitted light in relation to zero, and 100 per cent intensity of the same wave length as supplied by the source. The bridge is calibrated to read directly in per cent of total intensity of the light from the source. This explains the absolute nature of the measurements and accounts in part for the accuracy of the method, which is said to be correct to 0.1 per cent.

◂◂ Manufacturers' Publications

Industrial Buildings—An attractive 65-page booklet, recently issued by the Lockwood Green Engineers, Inc., New York City, gives a list of services, a partial list of clients, and illustrations of industrial plants and commercial buildings which this company has designed.

Mixers—The new "Turbo-Mixer," manufactured by the Turbo-Mixer Corporation, 233 Broadway, New York City, is fully described in a recent bulletin. Diagrammatic sketches illustrate the way in which mixing action is performed by this apparatus.

Corn Huskers—Many illustrations showing the Tuc Corn Husker in actual operation are shown in a bulletin recently published by the United Company, Continental Trust Building, Baltimore, Md. A complete description of the machine is also given.

Gages—Catalog No. 1009, recently published by the Bristol Company, Waterbury, Conn., describes in detail the many types of recording pressure and vacuum gages manufactured by this company. The booklet contains many illustrations.

Electrical Equipment. General Electric Company, Schenectady, N. Y.—Circulars No. GEA-74B, describing totally inclosed fan-cooled squirrel cage motors; GEA-752A, describing type BD direct current motors of from ½ to 3 hp.; GEA-416B, describing CR7051 automatic starting compensators for 2 and 3 phase squirrel cage induction motors.

Care of Pneumatic Truck Tires. Hood Rubber Company, Watertown, Mass.—Twenty-page booklet of a non-advertising nature giving helpful information on the care of pneumatic truck tires, suitable for putting into the hands of truck chauffeurs.

Boiler Room Accessories. Combustion Engineering Corporation, 200 Madison Ave., New York City—Four-page folder describing in detail the C-E water level indicator that permits a person on the floor easily reading the water level in a high boiler regardless of the height of the boiler.

Water Stills. Barnsted Still & Sterilizer Company, Inc., Forest Hills, Boston, Mass.—Catalog A, 32 pages, describing the uses of distilled water, different types of stills, and water sterilizing apparatus.

Gyratory Sifters. The Orville Simpson Company, Cincinnati, Ohio.—Supplement No. 803 to Catalog No. 80, showing Rotex screen selection charts, giving the essential data on this type of sifter.

Dryers. Gordon-Davis Engineering Company, 21 E. 40th St., New York City.—Circular describing the synchromatic continuous dryer having very large capacity.

Milk Dryers and Evaporators. Buffalo Foundry & Machine Company, 1635 Fillmore Avenue, Buffalo, N. Y.—Bulletin 244, telling of the new "Buflovak" stainless steel milk evaporator; Bulletin 245, treating the "Buflovak" milk dryers.

Recorders. Taylor Instrument Companies, Rochester, N. Y.—A leaflet describing the "Tycos" four-in-one sanitary milk connection which makes recording instruments interchangeable on various vats and tanks.

Grinding Equipment. Raymond Brothers Impact Pulverizer Company, Chicago.—Catalog 18 describing Raymond roller mills with air separation used for grinding sugar, coal and various substances requiring very fine grinding. Twenty pages with ample illustrations and drawings.

Centrifugal Spray Drying. Industrial Associates, Inc., 101 Park Ave., New York City.—Folder showing the flow sheet of material through this new system of spray drying.

Continuous Automatic Weighing. Richardson Scale Company, Clifton, N. J.—Bulletin 1629G, describing the Convey-O-Weigh system of continuous automatic weighing of all sorts of solids. Illustrated with pictures and line drawings, thirty-two pages.

Packing Scales. The Exact Weight Scale Company, Columbus, Ohio.—Catalog describing the various types of high speed accurately weighing Exact Weight Scales.

Barrel and Drum Equipment. The Volu-meter Company, Inc., 710 Ohio St., Buffalo, N. Y.—Portfolio of circulars showing the mechanically operated equipment for cleaning, filling, inspecting, agitating and filling of drums and barrels as well as filling cans.

Dryers and Evaporators. Struthers-Wells Company, Warren, Pa.—Circular 41, treating rotary dryers; Circular 42, treating the "IHV" Evaporator; circular 43, discussing the use of chrome and alloy steels in the fabrication of process equipment.

Hydrogen Ion Concentration. Travis Colloid Research Company, Inc., 119 Broad Street, New York City—Pamphlet explaining the Wulff colorimeter method of finding pH by means of indicator strips.

Electrical Equipment. Wagner Electric Corporation, 6400 Plymouth Ave., St. Louis, Mo.—Bulletin 165, completely descriptive of squirrel cage motors; bulletin 159, large vertical motors.

Blowers. Connersville Blower Company, Connersville, Ind.—Bulletin 110, "R-S" and "R-D" blowers for medium capacity range; bulletin 305, illustrating application of Connersville gas meters.

News of the Month

"Del Monte" Trademark Decision Reversed

"DEL MONTE" as a trademark for coffee cannot be registered by Tillman & Bendell, Inc., despite a claim of use since 1887, the Court of Customs and Patent Appeals has decided. In basing its decision in favor of the California Packing Company upon possible confusion to the public, rather than upon strict application of the "same descriptive properties" phrase, the court seems to have extended to a considerable degree the protection granted goods of a related nature, although not in the same class.

Substantially the same protection was granted under other decisions of this same court for "Maxwell House" for coffee and tea, and "Sun Maid" for raisins and other products, as well as for some other nationally known brands for goods outside the food industries.

The present decision reverses that made by the Commissioner of Patents over a year ago, when he dismissed a notice of opposition filed by the California Packing Company to an application for registry by Tillman & Bendell, Inc., and gave the latter company permission to continue to use the trademark on coffee.

The Commissioner at that time held that both parties had the right to continue using the name, inasmuch as the products were not directly similar, and that long acquiescence in such use eliminated the right to claim interference. The appeal decision, on the other hand, recognized the confusion in the public mind that exists when a company other than the one that uses "Del Monte" on canned goods of many kinds makes use of it. Since registry of "Del Monte" by Tillman & Bendell obviously would cause such confusion, the court ruled, use of the mark would be invalid under the common law, and registration was not authorized by the mere fact that coffee was not strictly "of the same descriptive properties" as materials on which the California Packing Company had been granted registration.

The recent entry of the California Packing Company itself into the marketing of vacuum-sealed coffee on a large scale, under the "Del Monte" name, added interest to the decision.

The basic principle of confusion of the public, rather than arbitrary rulings in regard to similarity in class of product, appears to be the way out of a dilemma arising with products such as coffee, which while hardly comparable to, say, canned fruit in itself, becomes, when vacuum-packed and on the grocer's shelves, a package of food that may be identical in appearance and closely connected in the public mind.

Government View Unchanged On Consent Decree

THE GOVERNMENT'S answer to amended petitions filed by Swift & Company and Armour & Company early in April for modification of the consent decree is the same as that made to the original petitions, namely, that the facts alleged are not sufficient to entitle the packers to the relief they are seeking at the hands of the Supreme Court of the District of Columbia.

In the amended petitions, which the packers were permitted to file pending a decision by the court on motions for dismissal made by the American Wholesale Grocers' Association and the National Wholesale Grocers' Association, the large packing houses allege that concentration of the retail meat business into the hands of a relatively small number of chain-store systems constitutes a serious danger to their business. The packers' petitions also request modification in order to bring the decree into conformity with new interpretations that have been placed on the anti-trust laws since they entered the decree in 1920.

COMING EVENTS

MAY

5-9—American Association of Cereal Chemists, Chicago, Ill.
7-9—Flavoring Extract Manufacturers' Association of the United States, Washington, D. C.
7-9—American Institute of Refrigerating Engineers, Atlanta, Ga.
8-9—American Oil Chemists' Society, New Orleans, La.
12-14—Southern Bakers' Association, Chattanooga, Tenn.
14—American Spice Trade Association, New York City.
20-23—Biscuit and Cracker Manufacturers' Association, Chicago, Ill.
22-23—Millers' National Federation, Chicago, Ill.
22-24—American Feed Manufacturers' Association, French Lick, Ind.

JUNE

2-6—Association of Operative Millers, Buffalo, N. Y.
3-6—National Confectioners' Association of the United States, Chicago, Ill.
4—American Cider Vinegar Manufacturers' Association, Rochester, N. Y.
4-6—American Institute of Chemical Engineers, Detroit, Mich.
24-26—National Macaroni Manufacturers' Association, Niagara Falls, N. Y.

Yellow Coloring Must Not Be Added to Salad Dressings

THE addition of coloring matter to mayonnaise, salad dressings, and similar products to simulate products with a higher egg content is prohibited by the federal pure food law, according to a recent announcement by the Food, Drug, and Insecticide Administration of the U. S. Department of Agriculture. The notice to the trade says:

"Accompanying the increase in the commercial production of mayonnaise and like products there has developed a tendency toward the use of artificial color in such articles. The color most often used in mayonnaise or in salad dressings which resemble mayonnaise has the effect of giving to the article the appearance ordinarily resulting from the use of egg. The federal Food and Drugs Act defines as adulterated an article of food which is colored in a manner whereby damage or inferiority is concealed. The addition to mayonnaise, salad dressings, and like products of a color which imparts to the finished product the appearance of higher egg content than is actually present brings the product within the definition of adulteration and the declaration of added color on the label does not relieve the article from this prohibition of the law. This opinion applies whether the color be of coal-tar or of vegetable origin."

Stop Australian Imports Of Many Foods

RECENT importation restrictions put into effect by the Australian government to stimulate home industry have fallen especially hard on raw and processed foodstuffs. The U. S. Department of Commerce lists the following items which cannot be imported to Australia except upon previous written consent of the Minister of Foreign Trade:

Biscuits; cheese; confectionery; corn flour; custard powders; eggs in shell or otherwise; fruits dried, excepting dates and figs; fruits preserved in liquid; gelatine; glucose; jams and jellies; jelly crystals and powders; lard and edible fats; lemons; meats preserved in tins and other airtight containers; milk in dried and powdered form, malted milk; onions; oranges; peanut butter; pickles; prepared coconut; pork preserved by cold process; sauces and chutney; starch and starch flour; vegetables salted or preserved in liquid, or partly preserved or pulped, vinegar and acetic acid.

Five Foodstuff Bills Before Congress; Action on Several Expected Soon

THE HAUGEN BILL to establish compulsory standards for preserve, jam, jelly, and apple butter, under which products deficient in fruit content would have to be labeled "imitation," has taken its place on the House calendar beside the Mapes bill requiring that all canned foods which do not meet the standards defined by the Department of Agriculture must be labeled "substandard." Both measures are intended to supplement the Food and Drugs Act to prevent adulteration and misbranding.

As reported to the House on April 10, the provisions of the Haugen bill are much more comprehensive than the form in which originally introduced. The labeling requirements have been broadened to make the definitions more effective and to protect the trade and public from unfair and deceptive practices. (An analysis of the bill, explaining the more important provisions, is given on page 193.)

No action has been taken by the House committee on Agriculture on the Hope bill providing for the establishment by the Department of Agriculture of permissive standard, for all grades of canned foods. At the hearings on the measure on March 26 and 27 the bill derived practically its only support from the Tri-State Packers' Association and the Wisconsin Canners' Association. The bill lacks affirmative support from the Department of Agriculture, and the National Canners' Association has withheld indorsement of the measure.

In a statement submitted to the committee by Representative Ketcham, Frank E. Gorrell, secretary of the National Canners' Association, stated that there is a difference of opinion in the canning industry regarding this bill. By enabling the canner to obtain a certificate of quality similar to that now given shippers of fresh fruits and vegetables, the bill appears to be a practical measure that would work for the good of the industry, said Mr. Gorrell, because it undoubtedly would avoid many rejection controversies.

The provision that would permit the canner to use such grades in the designation of his product, Mr. Gorrell stated, is appealing in theory but will not work in practice. While satisfactory for commercial transactions between buyer and seller, such grades, said Mr. Gorrell, would be unenforceable in a criminal court in proceedings under the Food and Drugs Act should misbranding be charged, because of the looseness of definitions which depend so much upon the taste of the individual.

Mr. Gorrell said that there is no disposition to oppose any legislation which will require additional information on a food package label, as the consumer is entitled to as much information as possible, and he expressed the hope that the time will come when some scientific basis can be worked out for determining definitions for the different grades of canned foods that would be enforceable in court.

No action has been taken either in the Senate or House on the Mapes-McNary bill to provide for the labeling of substandard canned foods.

Senator Copeland objects to the bill in its present form on the ground that it gives undue administrative authority to the Department of Agriculture. It is expected that when the measure is amended to provide for review of the department's action in establishing standards and labeling requirements prior to execution of libel proceedings, Senator Copeland will permit the bill to come to a vote when it is reached again on the consent calendar. Consideration of the bill has been blocked in the House by Representative Schafer, of Wisconsin.

After a year's deliberation the House committee on agriculture reported April 1 the Summers bill to regulate the marketing of perishable foodstuffs by licensing commission merchants, brokers, and dealers, and imposing penalties for the repudiation of contracts. In reporting the bill, the committee stated that unjustifiable rejection of shipments by buyers in city markets is one of the outstanding problems in the fruit and vegetable industry. The seller also is culpable, said the committee, because there are many instances where the shipper, after having signed a contract to deliver the commodity on a certain date in the future, sells to someone else at a higher price. The bill also is intended to control other unfair practices vexing the produce trade.

The oleomargarin bill, which passed the House early in February, is slated for early consideration by the Senate majority steering committee, sponsored by Senator Norbeck of South Dakota. It probably will come to a vote, with good prospects, within a few days after this notice is published. The bill provides that a growing class of artificial cooking fats made from coconut and peanut oils shall be taxable under the oleomargarin laws at ¼ cent per pound if not colored, and 10 cents if colored to resemble butter. Vendors would be subject to the expensive licensing system now in force.

No amendments have yet been announced either by the Senate committee on agriculture or by individual Senators. Nevertheless, it is believed that friends of the producers affected will introduce amendments seeking either to avoid the tax or to so broaden the bill that it will be impossible of passage. The only change to be expected might be the inclusion of naturally colored cooking fats made by packing concerns from yellow oils.

Tariff Struggle Nears End; Agricultural Rates Remain High in Conference

By Paul Wooton
Washington Correspondent

ASIDE from sugar, tariff adjustments on foodstuffs seem to be in final form. Because the general sentiment of Congress is toward adequate tariff aid to the farmer, nothing short of actual failure of the bill could be expected to shake the high rate structure now erected. Political promises to put agriculture on the same tariff status as other industries were no idle words. The thing has been done by an advance of 30 per cent or more in agricultural rates, with a tendency to scale down on the supplies necessary for farm operation.

Recent action of the joint conference committee between House and Senate has strengthened rather than lessened this general increase. Although the conferees struck a rough average between the levels set by the two chambers on most of the other schedules, they were inclined to accept the higher of the two on agricultural items. A gentlemen's agreement made before the bill was referred out of the House postponed consideration of sugar for later vote. Other controverted items, such as casein, cement, and lumber, likewise are deferred. At present, the House rate on sugar of 2.40 cents per 100 pounds against Cuba must be reconciled with the Senate rate of 2 cents. The present rate is 1.76. It is not unlikely that 2.20 will be reached as a compromise. The deferred vote was the result of maneuvering toward the highest possible duty, in order to get something more agreeable to sugar interests than the Senate rate.

Other changes are too numerous to enumerate, except in tabular form. On the opposite page are shown not only the recent changes made by the committee but also the House changes of existing law which were accepted by the Senate, and therefore have for some time been fixed, so far as the final bill is concerned. It is hardly expected that Congress will uproot many agricultural rates so late in the process and so close to adjournment time. Thus it is likely that nearly all the rates here listed will stand as final in the new law.

New Tariff Rates on Foodstuffs and Related Items

(Including rates established by the joint conference committee and previous changes differing from existing law.)

Duties are in cents per pound unless otherwise noted.
Paragraph numbers are those of the Senate bill.
The term "n.s.p.f." means "not specially provided for".

Paragraph	Item	Rates Existing	Rates Proposed
	CHEMICAL SCHEDULE		
19	Casein or lactarene	2½	Vote deferred 5½ proposed
25	Chicle: crude	10	Free
	refined	15	5
28	Vanillin	45%	7 plus 45%
36	Licorice root	½	Free
	Sarsaparilla root	1	Free
41	Edible gelatin, value less than 40	3½ plus 20%	5 plus 20%
	Gelatin and glue, n.s.p.f.:		
	Value less than 40	1½ plus 20%	2 plus 25%
	Value 40 or more	7 plus 20%	8 plus 25%
	Casein glue	25%	30%
47	Licorice extracts	25%	20%
48	Lemon or other citrus fruit juices unfit for beverage purposes	Free	5
53	Olive oil weighing with the immediate container less than 40 pounds	7½	9½
54	Palm kernel oil	Free	1
	Sesame oil	Free	3
	Soy-bean oil	2½	3½ but not less than 45%
56	Hydrogenated or hardened oils and fats	4	3
81	Sodium bicarbonate or baking soda	¼	Free
83	Starch: potato	1¾	2½
	all other, n.s.p.f.	1	1½
84	Dextrine: from potato starch or potato flour	2½	3
	n.s.p.f.	1¾	2
	METALS SCHEDULE		
339	Aluminum utensils	11 plus 55%	8½ plus 40%
372	Machinery n.s.p.f. and parts	30%	27½%
	SUGAR SCHEDULE		
501	Cuban sugar base rate, per 100 pounds	1.76	Vote deferred; 2.00 proposed
502	Blackstrap molasses	Essentially on basis of existing law	
503	Maple sugar	4	8
	Maple sirup	4	5½
	Dextrose not over 99.7% and dextrose sirup	1½	2
504	Sugar cane, unmanufactured, per ton of 2,000 pounds	$1	$2.50
	AGRICULTURAL SCHEDULE		
701	Cattle weighing: less than 1,050 pounds each	1½	....
	1,050 pounds or more	2	....
	less than 700 pounds each	....	2½
	700 pounds or more	....	3
	Beef and veal; fresh, chilled or frozen	3	6
	Dried blood albumen: light	Free	12
	dark	Free	6
703	Sheep, lambs, and goats	$2 each	$3 each
	Mutton and goat meat	2½	5
	Lamb	4	7
703	Swine	½	2
	Pork	¾	2½
	Bacon, hams, and shoulders	2	3¼
	Lard	1	3
	Lard compounds and lard substitutes	4	5
704	Reindeer meat, venison, and other game, except birds	4	6
706	Meats, n.s.p.f.	20%	6 but not less than 20%
707	Milk, per gal.	2½	6
	Cream, per gal.	20	56.6
	Skimmed milk and buttermilk, per gal.	1	2.1
708a	Milk, condensed or evaporated:		
	Unsweetened, in airtight containers	1	1.8
	Sweetened, in airtight containers	1½	2¾
	All other	1⅞	2.53
b	Dried whole milk	3	6½
	Dried cream	7	12½
	Dried skimmed milk and buttermilk	1½	3
c	Malted milk and milk and cream substitutes	20%	35%
709	Butter, oleomargarin and butter substitutes	8	14
710	Cheese and substitutes	5 but not less than 25%	8 but not less than 40%
711	Birds, live: poultry—chickens, ducks, geese, turkeys, guineas	3	8
	Baby chicks of poultry	3	4c. each
712	Birds, dead: poultry	6	10
	All others	8	10
	All dead birds prepared or preserved	35%	10
713	Eggs of poultry in the shell	8	10
	Eggs, frozen or prepared, n.s.p.f.	6	8
	Eggs, dried or sprayed: whole	18	18
717c	Fish, dried and unsalted: cod, haddock, hake, pollock, and cusk	1¼	2½
719	Fish, pickled or salted:		
	Cod, haddock, hake, pollock and cusk:		
	Not skinned or boned, containing over 43% moisture	1½	¾
	Skinned or boned	2½	2
720a	Fish, smoked or kippered:		
	Sea herring, eviscerated, split, boned, or divided into portions	1¼	3
	Cod, haddock, hake, pollock and cusk:		
	whole, beheaded or eviscerated	1¼	2½
	filleted, sliced, boned	1¾	3
	Other fish	1¼	25%
721b	Canned clams and clam juice	Free	30%
d	Caviar and fish roe other than sturgeon and not canned	30%	20
e	Canned oysters and oyster juice	Free	8

Paragraph	Item	Rates Existing	Rates Proposed
	AGRICULTURAL SCHEDULE—*Continued*		
723	Buckwheat, hulled or unhulled	10	25
724	Corn or maize, including cracked corn, per bu. of 56 pounds	15	25
	Corn grits, meal, etc., per 100 pounds	30	50
725	Macaroni and similar alimentary pastes, containing egg products	2	3
726	Oats, hulled or unhulled, per bu. of 32 pounds	15	16
727	Rice: paddy or rough	1	1½
	brown—hulls removed all or in part	1½	1⅔
	milled—bran removed all or in part	2	2½
	broken rice and rice meal, flour, polish, and bran	½	⅝
728	Rye malt	$5 per ton	40c. per 100 pounds
729	Wheat (per bu. of 60 pounds)	30c. bu.	42c. bu.
	Wheat unfit for human consumption	30c. bu.	10%
	Wheat flour and products n.s.p.f., per 100 pounds	78	$1.04
730	Bran, shorts and byproduct feeds	15%	10%
	Vegetable oil cake and oil-cake meal, including soy bean and n.s.p.f.	Free	0.3
735	Apricots, dried or evaporated	35%	2
737	Cherries: dried or evaporated	40%	6
	sulphured or in brine—with pits	2	5½
	—pits removed	2	9½
	maraschino or prepared or preserved	40%	9½ plus 40%
738	Vinegar, per proof gallon	6	8
739	Fruit peel, prepared or preserved: citron	4½	6
	lemon, orange, grapefruit	5	8
	n.s.p.f.	35%	8
740	Figs: fresh, dried, in brine, or paste	2	5
	prepared or preserved, n.s.p.f.	35%	40%
741	Dates: fresh or dried, pits removed	1	2
	in packages not more than 10 pounds each	1	7½
743	Lemons	2	2½
744	Olives, ripe: in brine, per gal.	20	30
	dried	4	5
746	Mangoes	35%	15
747	Pineapples: per crate of 2.45 cu.ft.	28.1c.	35
	in bulk, each	¾	1⅛
748	Plums, prunes, and prunellas: dried, dessicated or evaporated	½	2
750	Avocados	35%	15
752	Fruits, n.s.p.f.	25%	40%
756	Almonds: not shelled	4¾	5½
	shelled	14	16½
	prepared or preserved, including almond paste	14	18½
	Chestnuts and marrons	35%	25
757	Cream or Brazil nuts: not shelled	1	1½
	shelled	1	4½
	Filberts: not shelled	2½	5
	shelled	5	10
759	Peanuts: not shelled	3	4½
	shelled, prepared, etc.	4	7
760	Walnuts: not shelled	4	5
	shelled, prepared, etc.	12	15
	Pecans: not shelled	3	5
	shelled	6	10
761	Edible nuts, n.s.p.f.: not shelled	1	2½
	shelled	1	5
762	Flaxseed	40	65
	Soy beans	½	2
765	Beans n.s.p.f. and blackeye cowpeas: unripe	¾	3½
	dried	1¾	3
	Beans, prepared or preserved	2	3
768	Mushrooms	45%	10 plus 45%
	Truffles	25%	Free
769	Peas: green	1	3
	dried	1	1¾
	split	1½	2½
	Chickpeas or garbanzos	Free	Same as peas
770	Onions	1	2½
	Garlic	2	1½
771	White or Irish potatoes, per 100 pounds	50	75
772	Tomatoes: in natural state	½	3
	paste	40%	50%
	prepared or preserved	15%	50%
773	Turnips, per 100 pounds	12	25
	Rutabagas, per 100 pounds	25%	25
774	Vegetables in their natural state:		
	Peppers, eggplant, cucumbers, crude horseradish	25%	3
	Squash, celery, lettuce, cabbage	25%	2
	All others, n.s.p.f.	25%	50%
775	Sauerkraut	35%	50%
776	Chicory, crude	1½	2
	Acorns, chicory, or dandelion roots, ground or otherwise prepared	3	4
777	Chocolate or cocoa: unsweetened	17½% but not less than 2	3
	sweetened: bars weighing 10 pounds or more each	17½% but not less than 2	4
	in any form	17½% but not less than 2	40%
780	Lupulin	75	$1.50
871	Mustard seeds, whole	1	2

The following spices and spice seeds formerly dutiable at various rates, removed to the free list if unground or in natural state: anise, caraway, cardamon, cassia, cassia buds, and cassia vera, cloves, clove stems, cinnamon, cinnamon chips, coriander, cummin, fennel, ginger root, mace, mustard, nutmegs, black or white pepper, and pimento or allspice.

U. S. Meat Production Fell Slightly in 1929

A SLIGHT DECREASE in total meat production and consumption in the United States last year, as compared with 1928, was reported on April 18 by the Bureau of Agricultural Economics, U. S. Department of Agriculture. Total production of dressed meat, not including lard, was placed at 16,803,000,000 pounds in 1929, as compared with 16,955,000,000 pounds in 1928.

The 1929 total is made up of 6,065,000,000 pounds of beef, compared with 6,082,000,000 pounds in 1928; 816,000,000 pounds of veal, against 814,000,000 pounds in 1928; 699,000,000 pounds of lamb and mutton, against 671,000,000 pounds; and 9,223,000,000 pounds of pork, against 9,387,000,000 pounds.

Of the total 1929 production, 66.56 per cent came under federal inspection. The remainder was composed of the farm kill and commercial slaughter not government inspected. Some of the latter is inspected by state and local authorities, but the quantity so inspected is not known. Goat meat, the production of which aggregated about 1,000,000 pounds in each year, is not included in the total.

Per capita consumption of meats, excluding lard, is placed at 136.8 pounds, compared with 138 pounds in 1928, and 149.7 pounds in 1924, the record year since 1908. The smallest per capita consumption in the last 30 years, 120.1 pounds, was in 1917. The amount of lard used per capita last year was 14.3 pounds, as against 14.7 pounds in 1928. In the last 30 years lard consumption per capita has ranged from 10 pounds in 1905 to 15.4 pounds in 1924.

Xylose Plant Described at Chemical Society Meeting

INCREASING EVIDENCE that the South is rapidly becoming a seat of American industrialism appeared at the meeting of the American Chemical Society held at Atlanta, Ga., April 7 to 11. About 1,450 members and guests were in attendance and more than 500 papers were read and discussed.

Much interest was shown in a report by Walter T. Schriber on the operation of a plant for production of xylose, a five-carbon sugar, from cottonseed hull and bran on a semi-commercial scale. This plant was established as a co-operative project by the University of Alabama, the Swann Corporation, of Birmingham, Ala., and the U. S. Bureau of Standards. Samples of xylose, a so-called non-fattening sugar which is reported to be one-half as sweet as sucrose, were shown. Conversion cost of the xylose was given as about 5 cents per pound.

The liberation of vegetable oils by bacterial disintegration of the cell walls of vegetable materials such as coconut also attracted much attention. Dr. John Woods Beckman, of Oakland, Calif., offers this process as the first step in making the vegetable-oil industry truly a chemical one. The anaerobic bacteria for the process are obtained from brewers' malt and require suitable temperature and non-acid conditions.

A symposium on insecticides was conducted by R. C. Roark, of the U. S. Department of Agriculture. New fumigants, such as ethylene oxide, ethylene di-chloride and carboxide, as well as HCN, pyrethum, and chloroethanes, were discussed. Other papers dealt with contact insecticides, moth-proofing agents, and stomach insecticides.

—*With Sound Effects*

Manufacturers of shelled and salted peanuts were given a new sales argument in an affidavit filed in the New York Supreme Court not long ago in connection with a divorce case decision. Francis Meehan, son of the couple, said that one of the ways in which his father humiliated his mother was by cracking peanuts loudly while Elihu Root delivered an address at Hamilton College in June, 1924, when the son was graduated.

Food Officials Organize In New York Region

AN ASSOCIATION to bring together food and health officials of the area in and about New York City for the discussion of common problems and for correlation of activities has recently been formed. At the first meeting, held on March 5 in New York City, 40 federal, state, and municipal officials were present. Problems relating to canned foods, poultry, and milk were considered.

The organization is an informal one and it has no official name or membership roster. Attendance is by invitation. B. A. Pryke, New York State Commissioner of Agriculture and Markets, is president; W. R. M. Wharton, chief of the Eastern District Food, Drug, and Insecticide Administration, vice- president; and John Calloway, chief of the New York Station, Food, Drug and Insecticide Administration, secretary.

Speculation as to the exact significance of the organization has occasioned the statement that the informal gatherings of the group in no way supplant or conflict with official organizations now in existence. Meetings are to be held three times a year. The group has expressed a desire to have arranged at the next meeting, to be held in June 4, a display of various types of illegal poultry that have been found on the market in the past.

Electrical Sterilization To Be Investigated

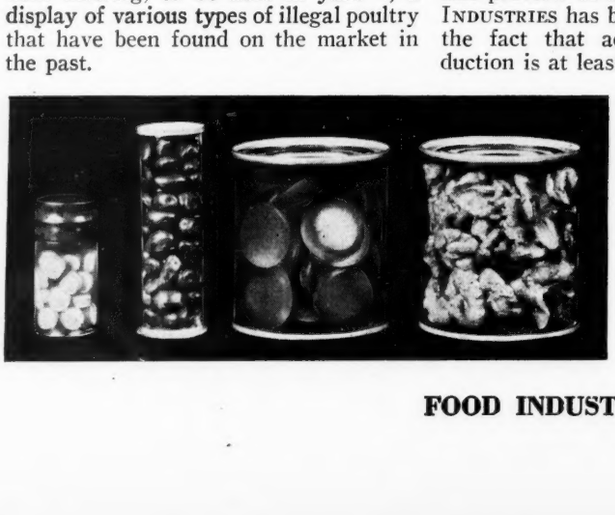
THE much discussed question as to the sterilizing effect of electricity applied to fruit juices and other liquids is to be investigated at the University of California Fruit Products Laboratory during the coming year. The studies will be carried on with the co-operation of the California Committee on the Relation of Electricity to Agriculture, and will be under the direction of Prof. W. V. Cruess, associate professor of fruit products. The actual work will be carried out by J. H. Irish, with the assistance of a graduate student. Plans are being made to study the numerous patented processes, such as the Electropure, and other forms of pasteurizing by electric heat; the Matzka process; and use of ultra-violet and X-rays.

Another Cellulose Container Being Developed

PROGRESS toward the ultimate development of transparent cellulose containers is shown in the accompanying illustration of "seamless" cans made by the Hygienic Tube Company, of Newark, N. J., from a synthetic substance which the company chooses to call Hyguloid. The material is odorless, flavorless, and is said to be able to withstand processing. Cans made up from this transparent substance have seamless bodies cut from seamless tubes of the Hyguloid, but the ends are of enameled tin plate. The ends are double-seamed or crimped in the usual manner by which the ends are placed on ordinary tin cans. The seaming is done in ordinary can-closing machines, with but a few minor changes, such as a slightly different chuck.

The transparent walls are about 0.010 inch in thickness. They are flexible, light in weight, and will withstand considerable rough treatment. The color of Hyguloid—which, by the way, is pronounced "Hi'ju-loid"—is nearly water white.

The cost of the containers, to answer the commonest inquiry, is not yet known in detail, for mass production is not yet under way. The most accurate estimate shows that it will be a container slightly more expensive than a tin can of the same size. In being permitted this preview of a future container FOOD INDUSTRIES has been asked to emphasize the fact that actual commercial production is at least four months away.



Experimental Cellulose Cans

TRADE NOTES

CALUMET BAKING POWDER COMPANY, Chicago, Ill., has had a complaint charging disparagement of a competitor's products dismissed by the Federal Trade Commission.

E. M. J. COLBY COMPANY, INC., New York City, has absorbed the Verlaine Candy Company and the Brevard Candy Company, manufacturers of high-grade confections. Brand names of the two companies will be continued by the merged organization.

CRANBERRY CANNERS, INC., a co-operative organization that will bring together the leading cranberry growers and canners in New England and New Jersey, has recently been formed. Six thousand acres of bogs and four canneries valued at $10,000,000, including properties of the Ocean Spray Preserving Company, of South Hanson, Mass.; the Makepeace Preserving Company, of Wareham, Mass.; and the Enoch F. Bills Company, of New Jersey, will be combined. Present output of the merged organization totals 500,000 cases a season. Products of the new combine will be marketed under the Ocean Spray brand name. Marcus L. Urann will be president of the new company; Isaac Harrison, vice-president; and J. C. Makepeace, secretary and treasurer.

FARWEST FISHERIES, INC., Seattle, Wash., has purchased the Alaska General Fisheries at Anchorage, Alaska, for a consideration placed at $250,000. The Anchorage plant, with a yearly capacity of 50,000 cases, will increase the output of the Seattle firm to 200,000 cases annually.

FRANKLIN PACKING COMPANY, Seattle, Wash., has announced the sale of its cannery in western Alaska to the Shepard Point Packing Company, in a deal involving $500,000. The plant is a two-line cannery with a capacity of more than 75,000 cases per year. The sale also includes eight trap sites on the eastern side of Prince William Sound.

GREAT WESTERN SUGAR COMPANY will have its new factory at Wheatland, Wyo., in operation next fall, according to company officials at Denver. The new plant, which brings the total owned by the company to 22, is designed to slice 1,400 tons of beets per day. Avery L. Clark, formerly superintendent of a plant at Lyman, Neb., will be in charge of the new plant.

INTERNATIONAL SALT COMPANY, through the Retsof Mining Company, a wholly owned subsidiary, has absorbed the Sterling Salt Company. The Retsof and Sterling companies operate contiguous properties at Retsof, N. Y.

KROGER GROCERY & BAKING COMPANY has undergone a complete rearrangement of executive control as a result of "friendly disagreement" on the policies regarding expansion. A few weeks ago William H. Albers resigned as president to become chairman of the board of directors, and Albert K. Morrill, for 15 years legal counsel for the company, was made president. It was announced on April 23 that Mr. Albers had resigned from the board of directors, and that the office will not be filled. B. H. Kroger, who was chairman of the board previous to Mr. Albers' short stay, remains as one of the directors, but B. H. Kroger, Jr., A. L. Nagel, and George H. Meiners have resigned. L. J. Huerkamp succeeds Mr. Meiners as secretary, and George Dent Crabbs, Charles W. Dupuis, and C. M. Robertson become directors. A decided downward revision of last year's earnings was announced by Mr. Morrill at the time of Mr. Albers' resignation. It is said that a management policy involving decentralization of control will be instituted. Financial affairs will be in the hands of C. M. Robertson, who was elected treasurer in the new alignment.

LIBBY, MCNEIL & LIBBY will vote May 22 on a recapitalization plan developed to save interest charges, to provide means of expansion, and to pave the way for payment of dividends on the common stock. The directors propose the retirement of 70,000 unissued shares 7 per cent preferred stock of $100 par value, and the issuance of 117,800 shares 6 per cent second preferred stock of $100 par value and 1,500,000 shares new common stock of $10 par value.

NATIONAL DAIRY PRODUCTS CORPORATION, through its board of directors, has given final approval to the merger with Kraft-Phenix Cheese Corporation. The Southern Dairies Corporation also has become a part of the organization, whose total assets will now be about $240,000,000. Total sales of the companies last year amounted to $400,000,000. Other companies recently acquired by National Dairy Products include the Highland Dairy Farms Company, St. Louis, Mo., D. H. Ewing's Sons, Inc., Louisville, Ky., and H. S. Chardayone, Inc., Brooklyn, N. Y.

NATIONAL MILLING COMPANY, Toledo, Ohio, will have a doubled capacity with the erection of additional elevators to cost approximately $600,000. This plant, owned by the National Biscuit Company, now mills about 6,000 barrels of flour daily.

NU-GRAPE COMPANY OF AMERICA, Atlanta, Ga., is said to have become the second largest soft-drink company in the United States with the acquisition of the Mavis Bottling Company of America, New York City.

PABST CORPORATION, Milwaukee, Wis., manufacturer of cheese and malt products, and the Puritan Malt Extract Company, Chicago, Ill., were recently merged. Economies of joint purchasing and research are said to have been the object. Separate operation of both manufacturing and sales departments will be continued.

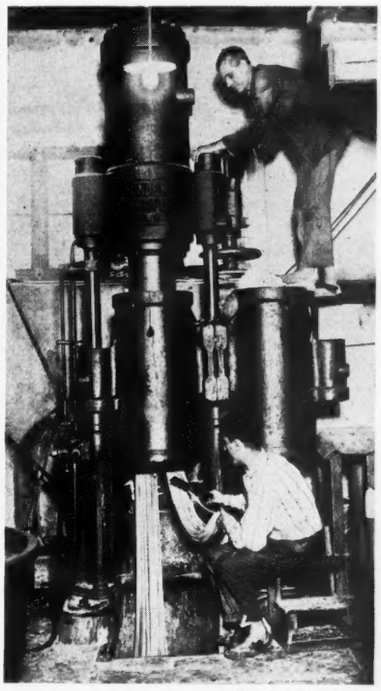
PACIFIC FISHERIES, Bellingham, Wash., has purchased the Emel Packing Company's plant at Valdez, Alaska, for $500,000, according to John Emel. Pacific Fisheries has acquired a number of fish-canning plants during the past year, giving the organization a total capacity of 1,000,000 cases of salmon per year. The Emel plant has had an average annual production of 65,000 cases of salmon since it was built in 1917.

PUNTA ALEGRE SUGAR COMPANY, which has suffered from financial difficulties as a result of conditions in the Cuban sugar industry, has announced to stockholders a reorganization plan to relieve it of fixed charges of $7,918,000 of funded debt.

SHERWOOD SNYDER FOOD COMPANY will erect a factory at Osborn, Ohio, in the near future, according to Sherwood Snyder, head of the firm. The company will manufacture a wide variety of food products, including fruit preserves, egg noodles, pickles, condiments, sandwich spreads, jellies, and salad dressings.

SUSSMAN, WORMSER & COMPANY, San Francisco, Calif., are introducing frozen fruits put up in 15-, 30- and 50-pound cans for restaurant, bakery, and other institutional outlets. Cherries were the first fruit to be so packed by the company, and results justified expansion.

Spaghetti Making—But Not in America



Herbert Photos, Inc.

Production of spaghetti "by the foot" has a literal as well as lineal significance in Italy, if this unappetizing, albeit picturesque, method of stuffing the cylinder with dough be typical. Comparison with any American plant leads to the thought that the heel of Mussolini might well be applied to sanitation laws with similar aplomb.

PERSONALS

WALLACE M. ALEXANDER, San Francisco, Calif., and Honolulu, Hawaii, recently retired from the presidency of Alexander & Baldwin, one of the important companies in the Hawaiian sugar industry, and was elected chairman of the board. JOHN WATERHOUSE, Honolulu, vice-president and general manager, was elected president to succeed Mr. Alexander. JOHN W. SPEYER has been named manager of the company's San Francisco office.

LELAND S. ARGALL, formerly manager of the Marshall Canning Company, Marshalltown, Iowa, is now vice-president and general manager of the Midwest Canning Corporation, Rochelle, Ill.

NEAL R. BAKER, manager of the Fairmont Creamery Company, Columbus, Ohio, has been elected president of the Ohio Butter, Egg, and Poultry Association.

HOWARD BAYNE and HUGH BLAIR-SMITH, New York City; L. MANUEL HENLER, Baltimore, Md.; and STANLEY M. ROSS, of Columbus, Ohio, have been elected members of the board of directors of the Borden Company to fill vacancies.

HOWARD BEATTY, general manager and vice-president of Durkee Famous Foods, Inc., a subsidiary of the Glidden Company, and Carl A. Baumann, vice-president in charge of Durkee sales, have been elected directors of the parent company.

V. C. CARROLL, for many years associated with J. G. Townsend & Company, of Delaware, the largest packer of Eastern cold-pack strawberries, has connected with W. H. Neal & Sons, Inc., of Frederica, Del. Mr. Carroll will continue his activity in the cold-pack strawberry business.

CARL C. CONWAY, formerly president of the Continental Can Company, has been named as chairman of the board to succeed THOMAS G. CRAMWELL, who recently resigned. O. C. HUFFMAN has been made president to succeed Mr. Conway. Mr. Huffman also has been elected a member of the executive committee.

ARTHUR L. DEAN, former president of the University of Hawaii, has resigned as director of the experiment station of the Association of Hawaiian Pineapple Canners. Dr. Dean is to become associated with Alexander & Baldwin to do special research work in connection with that company's pineapple interests.

WILLIAM C. EVANS has been elected chairman of the board of the Ward Baking Company to succeed the late Charles A. Ward. Howard B. Ward has been elected vice-president.

W. H. B. FOWLER, assistant publisher and general manager of the San Francisco *Chronicle*, was elected president of the Haiku Pineapple Company, Ltd. (factory at Haiku, island of Maui, T. H.), at a meeting of the board of directors recently held in San Francisco, Calif. RALPH SHAW was named assistant manager and chief agriculturist.

FRANK C. GEPHART, consulting chemist, has been retained by Refined Sugars, Inc., New York City, as technical advisor. His services will be available to users of sugar sirups manufactured by this company, for the solution of problems relating to the use of sugar.

Trade Conditions Improve

The second quarterly period of 1930 had a favorable opening. General business for the 4 weeks' period ending April 23, as indicated by check payments, was of proportions slightly above the average for the previous 4 weeks' period, and 6.1 per cent above the average volume reported for the previous 12 weeks. Business in general undoubtedly is on the upward trend, but is still currently of proportions some 16 per cent under this time last year. General manufacturing, as indicated by the consumption of electrical energy, is still about 7.8 per cent under this time last year, but is currently on the upward grade.

As pointed out by Julius H. Barnes, chairman of President Hoover's National Business Survey Conference, better conditions are evident in practically all lines —American industry is carrying out fully the constructive program forecast last December; there is a manifest adjustment of production of goods to current consumption; continued cautious, prudent merchandising policies mark retail distribution; and credit continues easy with a rise in the volume of new capital requirements. The underlying influences are heavily on the side of continued development, although it is doubtful if substantial and sustained recovery in business activity and in corporation profits is likely to materialize before late summer or autumn.

In general the food products industry is currently in a comparatively favorable position. The industry as a whole is operating on a plane about 10.5 per cent above this time last year, and the rate of activity for the first quarter was about 5 per cent above the same period in 1929. The lowering of the food price level to a point 9 per cent below last fall's peak by strict hand-to-mouth buying and the failure of stabilization schemes, while undoubtedly distressing to those who still own inventory stocks, promises to be a valuable influence in maintaining a sound condition during the coming producing season.

R. B. HENDERSON has been elected chairman of the board of directors of the Golden State Milk Products Company, San Francisco, Calif., to succeed L. E. W. PIODA, who has resigned on account of ill health. Mr. Pioda will continue as a director of the company.

GEORGE R. MCCLEERY, for the past three years manager of the Canton (Ohio) office of Armour & Company, has been transferred to Detroit to become assistant manager of the company's office in that city. G. E. COWAN, of the beef department in the Detroit plant, has been transferred to Canton to take up the position vacated by Mr. McCleery.

F. R. MURRIE, president of the Hershey Chocolate Company, Hershey, Pa., was recently elected president of the Association of Cocoa and Chocolate Manufacturers of the United States.

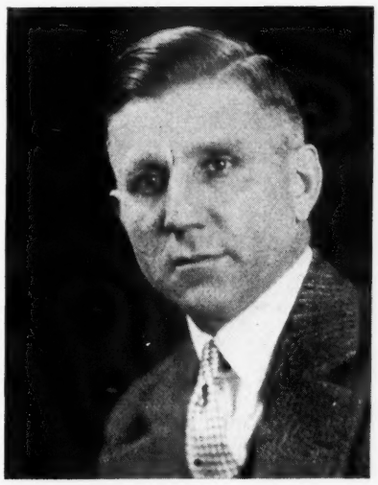
R. L. NAFZIGER, Kansas City, Mo., has been named president of the newly formed $50,000,000 Interstate Bakeries Corporation. This concern, a merger of the Schultz Baking Company, of Kansas City, operating ten plants in eight Middle Western cities, with seven baking companies on the Pacific Coast, becomes one of the five largest baking establishments in the country.

R. M. ROWAT, formerly chief chemist with Canada Packers, Ltd., is now attached to the staff of J. T. Donald & Company, Ltd., Toronto, Ont., where he will be engaged in consulting work, particularly to the food industries.

R. C. SHERWOOD has resigned the position of director of the State Testing Mill of Minnesota, and is now engaged on the mechanical staff of General Mills, Inc., with headquarters in Minneapolis, Minn.

CARLYLE THORPE, general manager of the California Walnut Growers' Association, has been named president and managing director of the Delaware operating corporation of the Sun-Maid Raisin Growers, Fresno, Calif. Mr. Thorpe succeeds HARRY M. CREECH, of San Francisco, resigned. The appointment is temporary, pending the outcome of the campaign to get 85 per cent of the raisin acreage into the co-operative. Permanent management will then be agreed upon, with the new membership voting.

E. S. STATELER, formerly general superintendent of the Eatmor Chocolate Company, Pittsburgh, Pa., recently joined the editorial staff of FOOD INDUSTRIES as an assistant editor. A graduate of the University of Kansas and the University of Pittsburgh, Mr. Stateler has been connected with the food industries almost continuously since 1916. He first served the State of Kansas as assistant analyst in the food laboratory. Upon his return to civil life following the World War, he was plant operating supervisor in the dye works of duPont de Nemours Corporation until 1920. He then entered the field



E. S. STATELER

of baking technology as industrial research fellow at Mellon Institute of Industrial Research. From 1923 until April of this year he was employed as chemist, as production manager and purchasing agent, and as plant superintendent of the Eatmor Chocolate Company.

E. G. WHITMORE, formerly in charge of the creamery at the California College of Agriculture, Davis, Calif., has been named federal-state grader at the Challenge Cream and Butter Association, Los Angeles, Calif.

EDWARD L. WIMPLE, formerly vice-president and general manager of the Warner Sugar Refining Company, has become associated with Lamborn & Company, Inc., as vice-president and general manager of the Chicago office. He will have charge of the company's interests in Illinois, Wisconsin, Missouri, Iowa, Minnesota, and the upper peninsula of Michigan.

OBITUARY

F. S. ARMSTRONG, vice-president of the Fajardo Sugar Refining Company, of Porto Rico, and formerly prominent in the sugar trade as a member of L. W. & P. Armstrong, New York City, died on April 16 at his home in New York City. Mr. Armstrong was formerly a director of the Atlantic Sugar Refining Company and other sugar companies.

A. H. CASE, vice-president since 1913 of Burrington, Case & Gibson, food brokers in Seattle, Wash., died March 16 in San Francisco, Calif., at the age of 55 years. Mr. Case was president of the Seattle Food Brokers' Association and an officer in the Kale Canning Company at the time of his death.

N. R. FAULKNER, one of the pioneers in Colorado beet culture, died at Glendale, Calif., recently at the age of 80. Mr. Faulkner was a resident of Loveland, Colo., from 1880 to 1928, and was largely responsible for the establishment in 1906 of a sugar factory there.

ABSOLOM FREEMAN, of Vancouver, B. C., a pioneer in the fishing industry of British Columbia, died at Vancouver, on March 23. He was the organizer of the original Canadian Fishing Company, and had been connected with the industry for 40 years.

CHRISTIAN OHER, formerly head of the National Dairy Company and later vice-president of the New York and Rider Dairy Company, died at his home in Jamaica, N. Y., on April 9. Mr. Oher was 60 years of age.

CHARLES E. SAFFORD, purchasing agent of the American Sugar Refining Company, New York City, died on March 12 after an illness of six weeks, at his home in Montclair, N. J. Mr. Safford, who was 74 years old, had been with this company for 57 years.

T. L. VALERIUS, president of the Valerius Corporation, Jefferson, Wis., and a director of the Dairy and Ice Cream Machinery and Supplies Association, died on March 29 at the age of 62.

JOHN W. ZWISSLER, past president of the Indiana Bakers' Association, died at Richmond, Ind., on March 24. Mr. Zwissler was 70 years of age and had long been well known in the baking industry.

New Construction

Bakery Plant—Gottfried Baking Co., 534 East 72nd St., New York, N. Y., awarded contract for the construction of a 4 story, 100 x 225 ft. bakery at 51st St. and 11th Ave. to White Construction Co., 95 Madison Ave., New York, N. Y. Estimated cost $600,000.

Bakery—H. S. Harper, 125 East 38th St., New York, N. Y., awarded contract for remodeling building at 51 Christopher St. for bakery to Gillies Campbell Co., 101 Park Ave., New York. Estimated cost $40,000.

Bakery—I. Kiel, 349 Hawthorne Ave., Newark, N. J., will receive bids about May 15, for a 1 story addition to bakery including ovens, baking machinery, etc. Estimated cost $40,000. F. P. Friedman, 395 Springfield Ave., Newark, is architect. Former bids rejected.

Bakery—Puritan Cake Co., 1166 Cambridge St., Cambridge, Mass., awarded contract for a 1 story, 50 x 125 ft. addition to bakery on Cambridge St., East Cambridge to Bakery & Delnick, 9 Wales St., Dorchester. Estimated cost $40,000 to $45,000.

Bakery — Robertson's Bakeries Ltd., 3665 Kingsway, Vancouver, B. C., will soon receive bids for a 2 and 4 story, 180 x 250 ft. bakery. Estimated cost $250,000. Chester and Alden, Rogers Bldg., Vancouver, are engineers. Electric ovens and equipment will be required.

Bakery — White House Baking Co., 11 Florence Pl., Lawrence, Mass., awarded contract for addition to bakery to Hardy Construction Co., 11 Chestnut St., Andover, Mass. Estimated cost $40,000.

Bottling Plant — Coleman & Keating, 112 Sudbury St., Boston, Mass., plans the construction of a bottling plant at Columbus Ave. Ext. and Amory St. Estimated cost $50,000. Architect not selected.

Bottling Plant—L. P. Croce Inc., 930 Summerfield Ave., Asbury Park, N. J., will receive bids about May 1 for the construction of a 1 story bottling plant. Estimated cost $40,000. C. B. Cook, Asbury Park Trust Bldg., Asbury Park, is architect.

Bottling Plants — Nehi Bottling Co., A. T. Howard, Pres., Columbus, Miss., awarded contract for a 1 story, 50 x 105 ft. bottling plant at Columbus, to D. S. McClanahan & Son, Columbus, also plant at 5th Ave. and Franklin St., Evansville, Ind., to C. Kanzler & Son, 500 Furn. Bldg., Evansville, $41,000.

Brewery — Capital Brewing Co. Ltd., 195 Powell Ave., Ottawa, Ont., awarded contract for a 4 story, 120 x 120 ft. brewery at Wellington St. and Champagne Ave., to H. Dagenais, 225 St. Patrick St., Ottawa. Estimated cost $200,000.

Candy Factory — Johnson & Fluker, 5 Haynes St., Atlanta, Ga., awarded contract for a 3 story, 75 x 150 ft. candy factory on Glenn St. to A. K. Adams, 542 Plum St., Atlanta.

Candy Factory—Tri-State Candy Co., c/o L. A. Cook, et al., Amarillo, Tex., plans extensive improvements to plant including purchase and installation of equipment for the manufacture of peanut butter and extracts. Private plans.

Confectionery Factory—Life Savers Ltd., P. J. McAndrew, Pres., Prescott, Ont., awarded contract for the construction of a confectionery factory to J. J. Fitzgerald & Co., Prescott. Estimated cost $50,000.

Canning Plant — B. Gaspersow, Kingsville, Ont., plans a 28 x 211 ft. addition to canning plant. Estimated cost $100,000. A. C. Miller, Hamilton, is architect.

Canning Plant — Hoosier Canning Co., Trafalgar, Ind., awarded contract for a 50 x 180 ft. factory to O. E. Fulmer, Bargersville. Estimated cost $40,600.

Canning Plant — Indian River Canning Co., Fort Pierce, Fla., plans the construction of a 90 x 140 ft. plant at South Second St. between Easter and Florida Aves. Estimated cost $100,000. (T. S. Kirby, J. Lochrie, F. S. Younghusband, C. W. Peters, W. C. Dickey and American Fruit Growers backers of enterprise.)

Canning Plant (Vegetable and Fruit)—East Texas Canning Co., Nacogdoches, Tex., will build 1 story, 40 x 60 ft. vegetable and fruit canning plant. Private plans.

Canning Plant Addition — Canadian Canners, B. Jasperson, Mgr., Kingsville, Ont., plans addition to canning plant. Equipment for canning tomatoes will be required.

Orange Juice Plant—Orange Health & Fruit Products Co., Los Angeles, Calif., awarded contract for the construction of a 2 story, 30 x 100 ft. orange juice plant at 606 West 14th St., Long Beach to Gay Engineering Corp., 2650 Santa Fe Ave., Los Angeles.

Creamery — Home Milk Co., Sacramento, Calif., awarded contract for a 1 and 2 story creamery at 21st and Q Sts., to Holdener Construction Co., 2608 R St., Sacramento. Estimated cost $40,000.

Creamery—Western Creamery Co., 242 West 4th St., Salt Lake City, Utah, D. W. Nielson, 1134 Gilmer Dr., Mgr., is having preliminary plans prepared for the construction of a creamery. Estimated cost $40,000.

Dairy Plant — Jackson Dairy Products Co., Jackson, Miss., awarded contract for a 2 story, 65 x 80 and 30 x 60 ft. dairy plant to W. G. Wetmore, Jackson, $23,000.

Dairy Plant—Picton County Dairy Co. Ltd., Stellarton, N. S., plans the construction of a dairy plant. Estimated cost $60,000.

Dairy Plant—Standard Dairy Co., c/o Rockford Consolidated Dairies Co., Rockford, Ill., awarded contract for the construction of a 2 story dairy plant at Arthur and Kilburn Sts. to Holm Page Co., 2117 Kishwaukee St., Rockford. Estimated cost $150,000.

Dairy Plant — Texas Dairy League, Alvin, Tex., is having preliminary plans prepared for the construction of a 1 story dairy plant at Arcadia.

Dairy and Creamery — Lauderdale County Dairies Inc., M. G. Ness, Pres., Meridian, Miss., will soon receive bids for the construction of a dairy and creamery. Estimated cost $150,000.

Dairy Products Building—Virginia Polytechnic Institute, Richmond, Va., is having plans prepared for additional buildings including dairy products building, etc. Estimated total cost $550,000.

Ice Cream Plant — Thermokept Dairies, Saratoga, N. Y., will soon award contract for a 2 story, 60 x 80 ft. ice cream plant. Estimated cost $50,000. G. R. Denton, Wayne, Pa., is architect.

Milk Plant—Northland Milk & Ice Cream Co., East 6th and Des Moines Sts., Des Moines, Ia., is having preliminary plans prepared for 1 and 2 story, 49 x 120 and 30 x 49 ft. addition to milk plant. Estimated cost $50,000. C. A. Watrous, 801 Southern Surety Bldg., Des Moines, is architect.

Milk Distribution Plant — M. H. Renken Dairy Co., 584 Myrtle Ave., Brooklyn, N. Y., awarded contract for the construction of a milk distribution plant at Maple Ave. and Long Beach Rd., Rockville Center to W. E. Anderson, 885 Flatbush Ave., Brooklyn. Estimated cost $200,000.

Milk Storage Plant and Depot—H. Sacks, 356 Lorraine Ave., Brooklyn, N. Y., will soon award contract for the construction of a milk storage plant and depot at 374 DeWitt Ave. Estimated cost $40,000. M. Perlstein, Middle Village, N. Y., is architect.

Cold Storage Plant—Florida Fruit & Produce Co., N. Dwoskin, Mgr., 416 West Bay St., Jacksonville, Fla., plans the construction of a large terminal cold storage plant.

Cold Storage Plant—Fulton Markets, Inc., C. Greenblatt, 330 West Main St., Waterbury, Conn., will soon award contract for a 2 story, 60 x 100 ft. cold storage plant on West Main St. Estimated cost $75,000. T. O. Appel, 185 Church St., New Haven, is architect. Conveying and refrigeration equipment (electric coolers and freezers) will be required.

Cold Storage Plant—Norfolk Fruit Growers Assn., J. E. Johnson, Mgr., Simcoe, Ont., awarded contract for a 4 story, 80 x 80 ft. cold storage plant to E. P. Muntz Ltd., 1104 Temple Bldg., Toronto. Estimated cost $100,000.

Cold Storage Plant—Springfield Ice & Refrigerating Co., 227 West Mill St., Springfield, Mo., awarded contract for a 2 story, 80 x 100 ft. addition to cold storage plant to A. Simpson Co., 2150 Curtis St., Denver, Colo. Estimated cost $75,000.

Ice Manufacturing Plants—Boston Ice Co., 11 Deerfield St., Boston, Mass., awarded contracts for two 1 story, 45 x 100 ft. ice manufacturing plants, one at Tremont St., Melrose, and one at Everett St., Revere, to Vappi & Ferguson, 515 Massachusetts Ave., Cambridge.

Ice Manufacturing—Hain Bros., Meadow St., Norwalk, Conn., is having revised plans prepared for a 1 story, 55 x 150 ft. ice manufacturing plant. Estimated cost $40,000. H. E. Koerner, 83 Fairfield Ave., Bridgeport, Conn., Archt.

Ice Manufacturing Plant — Rubel Ice Co., Fulton St., Brooklyn, N. Y., will soon award contract for the construction of an ice manufacturing plant at Eagle Ave. and 158th St. Estimated cost $300,000. H. J. Nurick, 44 Court St., Brooklyn, is architect.

Ice Plant—Central Power & Light Co., c/o Frost Bldg., San Antonio, Tex., awarded contract for a 40 ton ice plant at Woodsboro to Sumner Sollitt Co., 609 Frost Bldg., San Antonio. Estimated cost $32,000. Also awarded contract for a 1 story, 59 x 73 ft. ice plant at Edna, Tex., to H. E. Sulton, El Campo. Total estimated cost $40,000. Machinery contracts let.

Ice Plant—J. H. Filling, Washington, N. C., plans the construction of a 1 story, 50 x 70 ft. ice plant.

Ice Plant—J. B. Howe, Charleston, S. C., is having plans prepared for a 1 story ice plant. York Ice Machinery Co., 412 Houston St., N. E., Atlanta, Ga., is engineer.

Ice Plant—Springfield Ice Co., 91 Dwight St., Springfield, Mass., awarded contract for the construction of an artificial ice plant to E. F. Carlson, 1694 Main St., Springfield. Estimated cost $25,000.

Ice Storage Plant—Arctic Ice Co., 56 French St., New Brunswick, N. J., awarded contract for a 1 story ice storage plant on Paterson St. to Rogers & Sons Const. Co., 71 John St., New Brunswick. Estimated cost $40,000.

Ice and Cold Storage Plant—Guerin Investment Co., Melbourne, Fla., acquired a site and plans the construction of an ice and cold storage plant at Sebring. Estimated cost $75,000.

Pre-Cooling Plant — Consolidated Orange Growers Assn., Orange, Calif., awarded contract for a 3 story, 70 x 90 ft. pre-cooling plant to Gay Engineering Corp., 2650 Santa Fe Ave., Los Angeles. Estimated cost $75,000.

Fish Curing Plant—Fundy Products Ltd., J. E. O'Donnell, Mgr., Dipper Harbour, N. B., plans the construction of a fish curing plant.

Grocery Plant—H. J. Heinz Co., 2132 South Lafayette St., Fort Wayne, Ind., awarded contract for the construction of a 45 x 120 ft. grocery plant to Wade Amspaugh, 3132 Smith St., Fort Wayne. Estimated cost $436,000.

Grocery Plant—A. H. Perfect, Fort Wayne, Ind. (wholesale grocer), awarded contract for a 3 story, 60 x 125 ft. plant to Buesching & Hagerman, Fort Wayne. Estimated cost $42,000.

Grocery Warehouse — The Great Atlantic & Pacific Tea Co., Spring Grove Ave., Cincinnati, O., plans a 3 and 4 story, 105 x 400 ft. warehouse on Fredonia St. Estimated cost $200,000. W. D. Van Imwegen, Lexington, N. Y., is architect.

Grocery Warehouse—Grocers Wholesale Co., A. H. Minnis, Pres., 9th and Cherry Sts., Des Moines, Ia., is having preliminary plans prepared for a 2 story, 120 x 400 ft. grocery warehouse and office. Estimated cost $200,000.

Macaroni Factory — Roman Macaroni Co., 35-18 37th St., Long Island City, N. Y., awarded contract for the construction of a 3 story, 69 x 90 ft. factory at 8th Ave. and Pierce St., to York State Engineering & Contracting Co., 26 Court St. Estimated cost $40,000.

Relish Plant—California Supply Co., 738 Folsom St., San Francisco, Calif. (relishes) awarded contract for a 2 story factory at 7th and Brannan Sts., to E. C. Peterson, 666 Mission St., San Francisco. Estimated cost $90,000.

Elevator Tanks — Diamond Mill & Elevator Co., c/o H. G. Stinnett, Jr., Sherman, Tex., awarded contract for the construction of elevator tanks, 500,000 bu. capacity to Jones-Hettlesater Construction Co., Mutual Bldg., Kansas City, Mo. Estimated cost $60,000.

Flour Mill—Oklahoma City Mill & Elevator Co., First and Frances St., Oklahoma City, Okla., is having preliminary plans prepared for rebuilding flour mill destroyed by fire. Estimated cost $200,000. Engineer not announced.

Grain Elevator — Co-Operative Elevator & Supply Co., Meade, Kan., awarded contract for the construction of a 49 x 69 ft. grain elevator, 125,000 bu. capacity including 14 storage bins to Chalmers & Borton, Pioneer Trust Bldg., Kansas City, Mo. Estimated cost $45,000.

Grain Elevator — Co-Operative Equity Exchange, Cimarron, Kan., received lowest bid for the construction of a grain elevator from Industrial Engineering Co., 620 Kansas City Life Bldg., Kansas City, Mo. Estimated cost $45,000.

Grain Elevator—Dept. of Public Works, Boston, Mass., plans the construction of a grain elevator, 1,000,000 bu. capacity adjoining New Haven R.R. yards, South Boston. Private plans.

Grain Elevator — Dept. of Public Works, Parliament Bldg., Ottawa, Ont., plans the construction of a grain elevator at Prescott, K. M. Cameron, Parliament Bldg., Ottawa, is engineer.

Grain Elevator—Dept. of Railways & Canals, Parliament Bldgs., Ottawa, Ont., will receive bids until May 13 for the construction of a grain elevator, 2,500,000 bu. capacity. Estimated cost $3,000,000. A. E. Dubuc, Parliament Bldg., Ottawa, is chief engineer. C. D. Howe & Co., Whalen Bldg., Port Arthur, are consulting engineers.

Grain Elevator—Farmers Co-Operative Elevator & Mercantile Association, Dighton, Kan., awarded contract for the construction of a grain elevator to Industrial Engineering Co., 620 Kansas City Life Bldg., Kansas City, Mo. Estimated cost $49,689.

Grain Elevator Addition—Farmers Union Terminal Assn., M. W. Thatcher, Gen. Mgr., 418 Guardian Life Bldg., St. Paul, Minn., will build addition to grain elevator, 1,000,000 bu. capacity including facilities for loading into barges, at Mississippi River at foot of Chestnut St. Estimated cost $110,000. Private plans. Work will be done by day labor.

Grain Elevator — Fowler Equity Exchange, Fowler, Kan., awarded contract for a 45 x 69 ft. grain elevator, 180,000 bu. capacity, to include six round bins and two intersteel bins to Ryan & Flynn, Omaha, Neb. Estimated cost $40,000.

Grain Elevator—Haney Grain Co., Haney, Tex., plans the construction of a grain elevator, 22,000 bu. capacity. Estimated cost $28,000. Private plans.

Grain Elevator Addition—Jennings Grain Co., C. D. Jennings, Rorabaugh-Wiley Bldg., Hutchinson, Kan., will build addition to grain elevator including twelve circular bins, total capacity 550,000 bu. Work will be done by separate contracts under the supervision of Chalmers & Borton, 620 Pioneer Trust Bldg., Kansas City, Mo., engineers.

Grain Elevator—Minneola Co-Operative Exchange, Minneola, Kan., awarded contract for a 51 x 71 ft. grain elevator, 150,000 bu. capacity including 15 storage bins to Burrell Engineering & Construction Co., 400 West Madison St., Chicago, Ill. Estimated cost $50,000.

Grain Elevator—Missouri Pacific R.R., Missouri Pacific Bldg., St. Louis, Mo., awarded contract for an addition to grain elevator 2,076,000 bu. capacity at 7900 Van Buren St., to E. Ahlskog Co., 407 South Dearborn St., Chicago, Ill. Estimated cost $700,000.

Sausage Manufacturing Plant — Deerfoot Farms Co., Southboro, Mass., awarded contract for an addition and alterations to sausage manufacturing plant to G. Gonia Co., 2 Creek Sq., Boston. Estimated cost $60,000.

Grain Elevators—Oklahoma Wheat Pool Elevator Assn., Enid, Okla., plans the construction of eighty grain elevators in Texas, Oklahoma and New Mexico to include complete facilities.

Grain Elevator — Shepard Construction Co., Dalhart, Tex., will build a grain elevator at Lark. Estimated cost $75,000. Private plans. Work will be done by owner's forces.

Grain Elevator—Union Equity & Co-Operative Co., Enid, Okla., awarded contract for the construction of a grain elevator, 100,000 bu. capacity to include 16 bins to A. F. Roberts, Sabetha, Kan.

Grain Elevator—Vancouver Harbor Commission, 525 Seymour St., Vancouver, B. C., will soon award contract for addition to grain elevator, 2,000,000 bu. capacity. Estimated cost $800,000. Private plans.

Grain Elevator — Western Terminal Elevator Co., c/o B. F. Young, Mgr., Hutchinson, Kan., awarded contract for addition to grain elevator to double capacity of 500,000 bu. to Jones-Hettelsater Construction Co., 600 Mutual Bldg., Kansas City, Mo.

Grain Elevator—Wichita Public Elevator Co., c/o S. Wallingford, 302 North Terrace Dr., Wichita, Kan., is having preliminary plans prepared for addition to grain elevator to include 20 cylindrical tanks, each 97 ft. high and 18 ft. in diameter. Estimated cost $100,000. Private plans.

Grain Elevators — A. B. Borger, Amarillo, Tex., plans the construction of a central grain elevator, 1,000,000 bu. capacity at Amarillo, $250,000, also plans ten to fifteen grain elevators at different points on the Santa Fe and Rock Island lines in Panhandle district. These will serve as feeders to main elevator.

Grain Warehouse—National Milling Co., Front St., Toledo, O., awarded contract for the construction of a grain storage building to McDonald Engineering Co., 53 West Jackson Blvd., Chicago, Ill. Estimated cost $600,000.

Butterine Plant—Armour & Co., James and Central Sts., Kansas City, Kan., will build a 3 and 5 story, 80 x 90 ft. packing plant. Estimated cost $200,000. Private plans. Work will be done by separate contracts.

Packing Plant—Cleveland Provision Co., T. H. Nash, Secy., 2527 Canal Rd., Cleveland, O., is having preliminary plans prepared for a 2 story packing plant at 3378 West 65th St. Estimated cost $150,000. L. Maines, c/o owner, is architect.

Packing Plant—Cutlen-Lobinger Packing Co., Ontario, Calif., is having plans prepared for the construction of a packing plant at 57th Ave. and East 14th St., Oakland. Estimated cost $400,000. Austin Co. of California, 1924 Broadway, Oakland, is engineer.

Packing Plant and Warehouse—Libby, McNeill & Libby, Merchants Exchange Bldg., San Francisco, Calif., awarded contract for a 1 and 2 story packing plant and warehouse at Sunnyvale, to Barrett & Hilp, 918 Harrison St., San Francisco. Estimated cost $50,000.

Packing Plant—Loudon Packing Co., Terre Haute, Ind., awarded contract for a 1 story, 140 x 160 ft. packing plant at South 3rd St. to Adams & Sanford, 629 Cherry St. Estimated cost $51,000.

Packing Plant—Newark Packing Co., 217 Astor St., Newark, N. J., will soon award contract for a 3 story addition to warehouse in connection with packing plant. Estimated cost $150,000. F. A. Phelps, 21 Fulton St., Newark, is architect.

Meat Storage Plant—Swift & Co., Sewall Ave., Asbury Park, N. J., is having sketches made for the construction of a 2 story meat storage plant. Estimated cost $40,000. Architect not announced.

Packing Plant—West Philadelphia Stock Yards Co., Race St., Philadelphia, Pa., is receiving bids on revised plans for the construction of a packing plant. Estimated cost $1,000,000. C. B. Comstock, 122 East 42nd St., New York, N. Y., is architect.

Packing Plant (Poultry)—Selby Poultry Co., Webster City, Ia., awarded contract for the construction of a 60 x 120 ft. poultry packing plant to Zitterell-Mills Co., Webster City. Estimated cost $70,000.

Plant — Poultryman's Co-Operative Milling Association, 1513 Mirasol St., Los Angeles, Calif., is having preliminary plans prepared for the construction of a plant at Porterville. Estimated cost $60,000. H. T. Honn, 1709 West 8th St., Los Angeles, Archt.

Pork and Dairy Products Plant—Deerfoot Farms, Inc., Southboro, Mass., will soon award contract for the construction of a plant for the production of pork and dairy products. Estimated cost $40,000. Private plans.